

Toward a pedagogy of speculative fabulation

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Abstract

In resistance to capitalist logics of speculation, this article argues for audacious pedagogies of speculative fabulation. The kinds of pedagogical endeavours that times of uncertainty call for are by no means straightforward, calling as I argue along with Elizabeth de Freitas (2020) writing in this issue, for more venturesome approaches informed by speculative posthuman inquiries and exploratory new materialisms. The Anthropocene or Capitalocene are terms that capture equivocal nature of the crisis-riven present. Laden with contradiction and destruction, these descriptors also embody strange afterlives. Beyond problematic present/futures produced by humans only for themselves lie intimate and uncanny *sympoiesis*, world-buildings and meaning-makings with non-human others and more than human processes. In accounting for these as well as for the already entangled material conditions of our time, pedagogy needs to pay attention to the slippery nature of cognition itself; a task to which the genre of science-fiction or speculative fabulation (SF) is primed.

Keywords: Anthropocene, bewilderment, cognitive biology, New materialism, posthumanism, science-fiction/speculative fabulation, *sympoiesis*, trickster, unthought

Introduction: speculative fabulation, new materialism and education

Pedagogies that aim to be meaningful in these times of crises need to account for the equivocal nature of materiality as well as to the slippery nature of our attempts to know and teach it. Speculative fabulation, or science fiction (SF), holds indisputable value for higher education (HE) pedagogies that are interested in such endeavours precisely because it embraces uncomfortable yet productive tensions, while being able to diffract contradictory orders of meaning-making. Combining insights from diverse fields (spanning the hard and soft sciences, as well as the arts) with the fantastic, surreal and uncanny, SF presents cartographies of catastrophe and renewal premised on tactics of defamiliarization and cognitive estrangement that enables slippages into genuinely novel territories for thinking, feeling and doing differently. While, as de Freitas (2020) observes in this issue, SF ‘appeals to relational ontologies and methodologies that remix the physical and social sciences,’ it also gives rise to ‘uncomfortable affinities’ with the more-than-



human world with which humans are inseparably co-constituted. Such mappings of a posthuman/more-than-human unknown are not flights of creative whimsy. As socio-economic crises, environmental catastrophes and neoliberal economising increasingly produce and reproduce conditions of increasing precarity, HE needs to break free from the shackles of 'capitalist realism' and human exceptionalism that have come to exert such a poisoned stranglehold over all forms of social reproduction (including education). SF, as I argue here, presents HE with invaluable perspectives on navigating not only the ambiguous nature of materiality and cognition, but also the enormous material problems that are currently imperilling the future of life itself.

SF presents figurations or narratives of 'intra-active' subjectivity that, in Donna Haraway's words, act as 'material-semiotic nodes or knots in which diverse bodies and meanings co-shape one another' (2007: 4). These kinds of figurative *sympoiesis*, or 'makings-with,' are favoured by venturesome new materialist philosophies that, as de Freitas (2020) writes in this issue, 'pursue metamorphic couplings across conventional divides of matter-meaning.' We are urged, in the process, to move toward more open systems of knowledge production in education; systems that will help us '[re]think the meaning of the disavowed relations in which we are already entangled ... relations that involve humans, animals, machines and things' (Snaza, et al., 2014: 52). Taken in the posthuman/new materialist sense, SF asks that we 're-orient ourselves elsewhere' and 'mobilise the possibilities of this elsewhere' toward the production of new meanings that 'displace and dispose of humanness as the presumed ground' around which meanings are typically assembled (2014: 51). If meaning can be understood as 'the interactions among patterns of information creation and the randomness of unperceived patterns' (2014: 51) this raises the speculative question of how exactly meaning emerges in the first place as an embodied response to materiality and its affective conditions.

Contemporary SF, along with the new materialisms, thus call on us to pay attention to recent developments in the life sciences – particularly, as this paper argues, to the more-than-human meaning-making figurations revealed by recent developments in cognitive biology. While scientific endeavours find themselves entangled with their problematic inheritances, which continue to replicate 'the foundational and epistemic violence of European colonialism' (Davis and Todd, 2017: 769), SF and new materialist philosophies ask that we pay attention to promising new developments in the sciences that are ushering new forms of noticing. Elizabeth Wilson, in *Gut Feminism* (2015: 5), writes that new insights in cognitive biology have, of late, begun to move away from the 'convention that the neurobiology that counts is all above the neck [and started] to think about minded states as enacted not just by the brain but also by the distributed network of nerves that innervates the [bodily] periphery'. New studies of cognition have begun to subvert mind/body, self/other and nature/culture dualisms by revealing that human meaning-making emerges from more-than-human affects. Consciousness and pattern-recognition in the human brain are woven as William Connolly (2002: 10) observes, from 'dissonant relays and feedback loops' as well as 'complex, layered' interactions between 'different bodily sites'. Meaning is triggered by pre-individual nonconscious sensations, moods, and flavours, assembled from

affective chemical knots, tied, and untied across multiple bodily sites at differential speeds and, crucially, across complex nutrient-absorption processes at work in our multispecies guts. Researchers and educators, like Wilson, de Freitas, Snaza, Probyn, Haraway, and Barad (to name but a few) have mobilised on such developments, taking onboard scientific accounts of materiality and cognition, while troubling 'standard historical and scientific materialisms that are invested in the ideology of progress and the fantasy of the human subject's autonomous self-containment' (Carstens, 2019: 139).

Mobilising uncanny and bewildering pedagogies of resistance

The multimodal semiotic/chemical/neuro-affective more-than-human nature of cognition challenges us to generate a pedagogical praxis of speculative fabulation and bewilderment. In *A Thousand Plateaus: Capitalism and Schizophrenia* (1988), Gilles Deleuze and Félix Guattari outline the groundwork for such an approach by giving an example of how such a venturesome pedagogy might work in practice. Through the voice of a fictional pedagogue, Professor Challenger, they deliver a delirious lecture on a pedagogy of more-than-human material-semiotic meaning-making that weaves together a diversity of signals and affective regimes originating from the sciences (physics, chemistry, biology, economics and sociology) and the arts (minor literature, experimental painting, music, radical Spinozist ethics and innovative philosophy). The result is a distinctive kind of posthuman pedagogy that Joshua Ramey (2013) terms learning the uncanny. Filled with 'double articulations' that present inert 'forms and substances' alongside mercurial 'lines of flight,' operating at differential speeds, Challenger's spooky lecture so thoroughly bewilders his fictional students, that it generates an affective 'gate-opening' between the scientific/technological and the mystical, the heterogenous and the singular, the human and the non-human, the fixed and the fluid (Deleuze and Guattari, 1988: 72-73). Nathan Snaza (2019) draws our attention to an analogous bewildering pedagogical scene that occurs in Bam Stoker's *Dracula* when Dr Von Helsing delivers a disorienting lecture to Dr Steward; a lecture that so crowds and confuses Dr Steward's mind with geological, biological, historical, psychological and affective detail that it fires-up his imagination into conceiving a solution to a problem that his mind had not yet fully grasped. 'Before there is cognition,' as Snaza explains (2019: 77), 'there is an exposure to a set of relations that disorientates, and in disorientating sets part of self into motion'. What goads imagination 'is the affective experience of bewilderment, which becomes event precisely in the relation between a disciplined attentive apparatus' – that of the schooled and encultured mind – and 'a messy, unknowable set of [more-than-human] relations that are always swirling around' us, affecting us, even though we don't consciously register them (2019: 78).

As Wilson (2015) and Connolly's (2002) insights, as well as the examples of Professor Challenger and Dr Von Helsing aptly illustrate, thinking and teaching about matter and materiality – and, indeed, about what it means to be human in a more-than-human world – means considering how other-than-human processes impact the ways we think, parse, or make sense of the world. Thinking and teaching, considered from such perspectives, is transformed into a

spectral, bewildering, and affective speculative engagement that grapples with the uncanny nature of cognition itself. As Snaza (2019: 100) observes, before we even 'know we are sensing a thing, we are moving toward or away from it corporeally, and we are being moved by it,' affectively and emotionally toward 'a kind of knowledge' (in the sense of conscious cognition) that is 'belated, arriving on the scene [only] in a certain mood that primes the body to think it'. Sigmund Freud's neologism *Nachträglichkeit* or 'deferred action' captures the uncanny 'afterwardsness' of thinking/feeling, describing the 'retroactive temporality' whereby the conscious self fictionalises itself in belated relation to the materiality of events, sensing only after-effects and after-images (Bistoën, et al., 2014: 672-73). Ghostly effects of delay and deferral like *déjà vu* epitomise the Freudian sense of the uncanny by scrambling our perceptions of present and presence; it is only in the otherness of their radical spectrality or ghostliness that material objects, things, bodies or events allow us to approach them and know them. Pedagogy occurs in this equivocal space between sensing, thinking, and knowing. The spectral afterwardsness of cognition does not, however, imply that reality is unknowable or unteachable; what it should alert us to, however, is that no single epistemological stratagem (such as reductive science, for example) will completely suffice for knowing (or teaching about) materiality. The spiralling multitemporal nature of matter, existing at all scales and variations – as recent developments in physics and the life sciences have demonstrated and indigenous cosmologies have long held sacrosanct – announces the radical protean multiplexity of materiality and the impossibility of single-vision in our attempts to parse meaning, create knowledge or teach (about) it. The persistence of the uncanny in our cognitive and pedagogical attempts to approach matter and materiality signals that there are always other ways of knowing and doing. We are directed thus toward a more venturesome pedagogy of speculative fabulation that is more fully able to account for the slippery nature of materiality and our incomplete attempts to parse it.

Throughout *A thousand plateaus*, Deleuze and Guattari utilise SF as a pedagogical tool-kit to, as Joshua Ramey writes, create 'dramatic encounters' as well as to generate moments of lively confrontation, that 'provoke the mind to interpret and to create' (2013: 177). More than the mind, however, is being provoked by the affect-laden Deleuze-Guattarian pedagogical encounter, which urges us toward a pedagogy that is able to account for aesthetics, affects, ambiances (or haecceities) and an array of multiple interacting more-than-human systems in which humans and their meaning-making systems are inextricably embedded (such as pre-individual affects, bacterial, plant and animal assemblages, meteorological cycles, chemical gradients, geological processes, etc., all of which operate at differential speeds, intensities, and scales).

In order to respond to this entangled, spiralling and equivocal world-making assemblage that completely exceeds the belatedness of human consciousness or reason, pedagogy needs, more than ever, to employ the uncanny (the ambiguous, the spectral, and the difficult to determine). Today, in the age of the Anthropocene/Capitalocene, when the biosphere of the planet itself is being undone (along with all its rich multimodal/multispecies world-makings) there is a desperate need for more exploratory pedagogies that move against the grain of traditionally conceived, tightly disciplined and narrowly focused human-centred/humanist education systems.

Against the neoliberal injunction that no pedagogical resistance to the 'grey curtain' of 'capitalist realism' is possible, even 'the tiniest [pedagogical] event can tear a hole. ... From a situation in which nothing can happen, suddenly anything is possible' (Fisher, 2009: 81). As Wilson (2015) writes, we are called upon to challenge long-standing reductionist paradigms that see learning and thought as something that involves individual human brains and discreet human bodies. Aside from involving innumerable sensory signals hitting the bodily peripheries (atmospheres, flavours, sounds, smells, movements, postures, colours, etc.), learning is intimately tied to the affective and chemical 'substrata' of our multispecies guts as well as to a multitude of more-than-human materials, affects, processes and living substances carousing through or impacting on the body at any given moment (2015: 63). Meaning-making figurations, whether involving individual human attempts at cognition or the stratagems of educational systems are already, intrinsically, more-than-human.

According to Haraway (2007: 4), there is much that pedagogy can take from the 'meaning-making figures' of SF, which 'gather up those who respond to them into unpredictable kinds of 'we,' presenting a potentially transformative posthuman/new materialist relational ethico-onto-epistemology. This involves incorporating an aesthetic sensibility in which knowledge and feeling are presented as situated, conditional, accountable, affective, fluid and dynamic, as well as continually altered by more-than-human interactions that traverse multiple orders of knowledge-making and being. SF, and SF-inspired pedagogies, are at ease with the uncertainty evoked by such a sensibility which takes up the challenge of learning the uncanny. The sense of wonder – so integral to learning – that might in some examples of SF be conveyed through marvel, scientific or otherwise, might just as readily be conveyed in others through radical uncertainty, as de Freitas's example of SF in this issue readily demonstrate. Her case, Liu Cixin's *The Three Body Problem* (2008), presents an instance of SF that moves against the world of reasoned humanist knowing and certitude toward a terrifying more-than-human universe that extends infinitely beyond us. This example of SF does what all venturesome pedagogies should, namely, cultivating an openness to that which exceeds current knowledge paradigms via experimental imaginative and affective confrontations with the uncanny. Pedagogies of bewilderment carry us through 'thresholds and doors, where becoming itself becomes' (Deleuze and Guattari, 1988: 249), challenging us to engage in speculative more-than-human meaning makings that are open to the possibility of radical transformation.

Reaching into the death-places of the Anthropocene

There is a manifest urgency in attempting to open pedagogy to the bewildering and uncanny effects and affects of the contemporary Anthropocene crisis. 'Will expanding death effects diminish us further as the life sustaining capacities of the Earth are [increasingly] degraded and extinguished?' (Rose, 2011: 146). In the midst of an escalating double-death – as both species and their relational networks are made to vanish from the Earth's biosphere, along with a diversity of human meaning-making languages and cultures – pedagogy needs to take stock of its objectives. If education seeks to 'reach out to make a difference' it will need to generate uncanny

pedagogical encounters with the 'death places' of the Anthropocene/Capitalocene, engaging with the strange afterlives 'emerging from extinctions' and challenging 'everything we thought we knew about who we are and how to live within the imperilled family of life on Earth' (2011: 146).

In channelling such apocalyptic effects and flavours, a pedagogy of speculative fabulation needs to teach about the dark side of human meaning-making figurations, especially those of rational/reductive science and the economic, educational, and political fancies they have inspired. Pedagogies that venture into the death-places of the Anthropocene will need to explore how, for the last 300 years, science has been conjuring a powerful world-shaping sorcery: The Enlightenment fabulation of progress. In this regard, science's sheer speculative inventiveness has been extraordinary. Pedagogy, along with the entirety of social reproduction, has been swept up in its forward march, unleashing a Pandora's box of 'progress traps' (technologies as well as technologically-enabled means of production, social and otherwise, with unintended, often disastrous, consequences) on the world. The ideology of progress has contaminated socio-economic systems, governments, and education itself, making nonsense of the multiple ways that humans and other lifeforms are embedded in the world, littering the world with trash, inappropriate technologies and dislocating lifestyles and destroying entire worlds of alternative meaning-making configuration in the process. Having once fuelled the comfortingness of progress narratives that promised bright and confident futures for some, science now finds itself facing an intractable enemy: that of accelerated superstitions and conspiracy theories (which are meaning-making figurations with their own dark sides) in a post-truth world that was paradoxically born from its bright light of reason. Assailed by front-page accounts of weaponised violence, invasive surveillance tech, chemical pollution, pandemics, and industrially produced global warming (with its hurricanes, floods, droughts, fires, and coral bleaching) the story of progressive, reductionist science is currently being subverted by spectres of its own making. This is something that pedagogy needs to critically account for.

It is from these troubled apocalyptic spectres that SF weaves its fabulations. While one side of SF faces the screen of human exceptionalism and certitude that progressive science erected, its other side faces radical indeterminacy. A pedagogy appropriate to Anthropocene/Capitalocene realities needs to pay close attention to such moves. Truth – to take up de Freitas's example of *The Three Body Problem* – is agitated by the limits and limitations of scientific knowledge and meaning-making practices. As it turns away from anthropocentrism and certitude, SF engages with culturally diverse modes of alternative meaning-making that run counter to the ideology of progress. Monkey King, Kitsune, Hermes, Eshun, Puck, Cagn, Loki, Raven, Coyote, and innumerable other tricksters have found new other-than-human guises in contemporary SF. That trickster lore, which is universal to all human cultures, has found a home in SF is hardly surprising. SF continues a long tradition of pedagogical resistance that, like the tutelary trickster stories of diverse folkloric traditions, speaks to the uncanniness that underscores attempts to know and master the world. Science and its progress stories are not immune to the ambiguities and cognitive *Nachträglichkeit* embodied by the trickster tradition. Like the progress-

stories to which many contemporary instances of SF speak, trickster fabulations expose that far from being epistemologically secure or privileged, all knowledge-making practices – especially those that insist on mastery and control – are riddled with indeterminacies.

In its conjurations of confrontations between different modes of thought and being, certainties and uncertainties, SF plays up its central theme of cognitive estrangement or *ostranie* (literally, making strange). Having begun with ‘encounters [with] strange animals’ and/or aliens, and then reached toward ‘the ultimate regions of a continuum inhabited by unnameable waves and particles,’ SF continually grapples with forces that drag humanity backward toward extinction, whilst simultaneously supplying impetus for movements forward into new modes of existence (Deleuze & Guattari, 1988: 248). This is perhaps the most significant quality of SF; its engagement, often contradictory and always uncanny and affective, with the limits of what we can both know and be. As educators and researchers struggle to reinvent more inclusive, ethical and speculative materialisms, the lesson to take from SF, as de Freitas (2020) notes in this issue, is to not to throw the science baby out with the reductionist/androcentric/anthropocentric/extractive-imperialist bathwater. Instead, we are called toward more venturesome, inclusive, and accountable sciences; materialisms that pursue sympathetic, *sympoietic*, affective, terrestrial, and metamorphic couplings. SF presents us with innumerable protocols for experimental pedagogies constructed along such lines. By generating thought experiments that reach beyond the death-worlds of the Anthropocene, SF presents pedagogy with an archive of the imagination where different subjectivities and categories of knowing/being – ontological, epistemological, ethical, political, scientific, mystical, etc. – can converge and cross-pollinate. SF calls us to confront, in our pedagogies, our boundaries and boundedness as humans; to find in the radically other and alien the equally radical possibility of other worlds of being, knowing, and becoming. Informed by the virtual worlds and fecund possibility spaces of SF, pedagogy might generate imaginative encounters with strange others under the sign of the unseen, grasp for the formerly imperceptible and open itself up to experiments with the limits of the known.

Grappling with the possibility of an outside of science

A renewed interest in SF and relational ontologies have occurred, as de Freitas remarks elsewhere, ‘alongside a growing interest in philosophies of immanence and a widespread turn to the study of non-human agency’ (2016: 224). This turn has drawn heavily on technical advances in information/computing technology; developments that have propelled molecular biology’s growing understanding of DNA’s informational chemistry, as well as cosmology’s grasp of the quantum informational substrate of the universe (or, rather, the pluriverse or spookiverse). That everything in nature and the cosmos computes is an ancient cosmological insight that is gaining new cultural tract in an age of unprecedented crisis and material transformation that abounds with irony. The ‘intellectual, cultural, and technical convergence’ that Donna Haraway refers to the ‘new new synthesis’ (2017: M29) in biology coincides with a sixth mass extinction of biological life brought on in no small part by the advances in software analytics and computing power that made the ‘new new synthesis’ possible. Advances in computing have, after all, extended the

tentacles of biopolitical capitalism into the very bedrock of planet Earth (Cooper, 2008). As de Freitas writes elsewhere, 'we witness here how the concept of ecology has become increasingly denaturalised in our current diffuse technosphere where power is environmentalised by media technologies allowing for new forms of governmentality and control' (2018: 88).

The life-sciences, along with computer sciences, find themselves messily entangled with the algorithmic control regimes and bio/necropolitical expulsion scenarios of 'disaster capitalism' whereby life is rendered as surplus to the economy and the gap between 'grievable' and 'ungrievable lives' is continually widened (Butler, 2020: n.p.). Here, educators and researchers in the biosciences, political sciences, history and sociology would do well to take heed of Melinda Cooper (2008) and Saskia Sassen's (2014) hard-hitting multidisciplinary investigations of the confluence of these fields with the brutal algorithmic economising of disaster capitalism. There are, of course, other sides to these unsavoury entanglements and assemblages. While living and non-living bodies and things are being converted into (data)minable informational materials, strange afterlives and posthuman promise continue to flourish in the wake of advances in informatics.

In the worlds of SF, Artificial intelligence (AI), quantum computing and cognitive biology call on us to account for a more-than-human world of agential capacities and relational networks that subvert attempts at control and mastery. SF invites us to discover that technology and science are, in fact, tricksters with whom we must learn to converse and form wary pacts. Alongside the example of the *Three Body Problem*, I can point here to multiple other examples. Award-winners like Adrien Tchaikovsky's *Children of Time* (2018) and *Children of Ruin* (2019) novels, Peter Watts incendiary *Blindsight* (2006), or Tade Thompson's Afrofuturist *Rosewater* (2017), for instance, are nuanced and invaluable explorations of the equivocal and trickster sides of science and technology. These, and many other examples of SF, test the boundaries and boundedness of trust in post-apocalyptic worlds where survival depends on the forging of intimate alliances with slippery non-human agencies that are material and extra-material, cognitive and non-conscious, biological and artificial. Not only do texts such as these grapple with the possibility of an outside of science as it is traditionally conceived, but they invite us to imagine the material/biological body, the planet and the cosmos itself as alive with trickster motive.

It was while conducting research for NASA that geochemist James Lovelock formulated the concept of *Gaia* – a supreme evolutionary force of nature; a vast, mysterious and distributed network of information which includes but infinitely extends beyond humans, and to which our species is utterly subservient, if not insignificant. In contemporary SF, informational networks – both biological and artificial – are extended into the abysses of cosmic space where dark materials and enigmatic forces hold sway. The more-than-human cosmos that information-age science is beginning to uncover includes a multitude of nonhuman forces, objects and beings, including the microbial aliens at work within our individual human bodies as well as the multitudes of non-humans sharing and sustaining our biosphere. It includes geological and industrially produced objects that exude strange, and even malevolent powers, machine networks, and even non-

terrestrial alien objects (meteorites, moon-dust and Martian soil samples, etc.). The landscapes that humans increasingly inhabit – the dynamically burgeoning networked communications landscape, the compromised ecosystems we're intractably entangled with and destroying – as well as the shifting alliances within our multispecies microbiomes, are alive with dark and vibrant matters and active nonhuman agents that are beginning to make pivotal contact with us. In an age of escalating and overlapping crises, humans are gaining unprecedented new insights into the dynamics of world-building and world-destroying. The very sciences and technologies that have enabled Anthropocene humans to intercede in geologic time have enabled us to perceive nonhuman agencies in surprising new ways. These agencies call us toward an uncanny pedagogy of speculative fabulation that, as de Freitas (2020) observes, is based on a tentative kind of trust, shadowed by apocalyptic forebodings.

In the Anthropocene, as in any other geological epoch, ecological succession is the replacement of one species by another; a process that should give us humans pause in the context of a currently unfolding anthropogenic sixth mass extinction of biological life whereby the planet's former biodiversity is being replaced with a tiny handful of organisms (humans, their factory-farmed/monocultured domesticates and opportunistic parasites) and fatally disrupted by capitalism's planet-altering extractive processes. While progress has generated mountains of poisonous waste that will show up in the future geological record, stratigraphic studies of this record reveal that Gaia has weathered multiple extinction and succession events. Insights gleaned from the 'new new synthesis' in biology reveal that life has survived innumerable crises by weaving strange experimental string-figures (via symbiotic partnerships and lateral gene transfers) that utterly defy systematic biological classification schemes (Haraway, 2017). As the human destruction of biological diversity intensifies, could strange unforeseen scenarios of ecological succession – new order-defying symbiogenetic becomings – beckon to us to form assemblages of silicon and stem cells, networks of waste, infectious diseases, and microbial gumbo? The unforeseen alliances with nonhuman others that populate SF as well as the co-evolution survival stories of the new biology conjure a politics of the impure that rubs shoulders with a grey sublime. Increasingly we humans populate a continuum between the human and the inhuman, occupying a borderland where the organic, the artificial, the engineered and the evolved are spectrally yet materially entangled. In an age of burgeoning extinctions, it is to these shifting borderlands and more-than-human assemblages that a pedagogy of speculative fabulation needs to turn its urgent attentions.

As de Freitas (2020) observes, the kinds of relational ontologies we encounter in speculative fiction remix the physical and social, hard and soft sciences, exploring our affinities with various kinds of problematic assumptions, naturalistic, realistic, casuistic, abstracted, reductive and so forth. Some of the most important SF to emerge in the past few decades have, like the new materialisms of feminist scholars like Haraway and Elizabeth Grosz, been mapping exciting and challenging developments in the life sciences and cognitive biology. The mutational 'metamorphic zones' opened by developments in this field have, as de Freitas (2020) notes, moved us away from purely epistemological questions regarding the warranting of scientific truth

claims, towards onto-ethical questions about the possibility of trusting more-than-human relations. In this new biological schema, all of life is in *sympoiesis*, or making-with as literally nothing in biology makes itself (Haraway, 2017). Assemblages dominate; symbionts, parasites, commensalists and pathogens are only some of the actants in life's complex trickster networks; actants that bring advantages, disadvantages, limitations, precarities and even dangers to a tangled mix that extends all the way up and down bodies, populations, food-chains and ecosystems. Balances are easily and catastrophically tipped one way or another, as Anthropocene humanity is starting to discover. There are, as de Freitas (2020) remarks, limits and incommensurables to all this making-with that are not easily accounted for by existing new materialisms or even science, for that matter: Trust becomes extremely tested in an global environment where new promiscuous and unfamiliar non-human agencies (from emerging algorithmic data-mining networks to pandemic-causing viruses) populate the earth. While the fruitful nature of terms like relationality and trust belie the ways in which they are lived in radically divergent ways, a more pressing question is how all these entangled biological and artificial networks compute or, rather cognate, as we enter into relationships of conditional trust or distrust with them. Cognition is perhaps the least studied and most troubling of all phenomena. Can an algorithmic network, virus, bacterium, plant, animal, or ecosystem think? That science is beginning to ask such questions indicates the persistence of a radical unthought far beyond any lingering humanist desires for relational correlationism. This is why I would warrant, along with Katherine Hayles in *Unthought* (2017), that it is the newly emergent field of cognitive biology, a facet of the new synthesis in biology, that HE pedagogies, in both the Sciences and Arts, will need to pay most careful attention to.

Spectral tricksters, SF, and new modes of learning

In the realm of contemporary cognitive biology, the 'critical role played by materiality in creating the structures and organisations from which cognition emerge' is coming under investigation (Hayles, 2017: 66). Our attention is drawn toward what Murray Shanahan (2016) terms conscious exotica, namely, uncanny non-human intelligences and memory-systems that exceed the bounded and embodied criteria of human experience. Conscious exotica, such as hunting spiders, cephalopods and perhaps, soon, AI networks, add an expansive, tactile, and fluid materiality to our ways of looking at, feeling, and making sense of the world. Computing bacterial networks and the uncanny evolutionary adaptive stratagems of non-life such as viruses are even more spectral in their exoticism. Spectral exotica, whether conscious or 'unthinking,' critically trouble normative constructions of history, temporality, genealogy, and identity. Such exotica are tricksters or, as Deleuze (1994) terms them, demons with immense pedagogical potential. While cognitive biologists as well as software programmers are beginning to parse their ecological and cyberspatial presences, mercurial beings such as these have long inhabited indigenous lore in the form of tricksters (Pelton, 1980).

Tutelary tricksters, it seems, have always been amongst us; curious amalgamations of technology and magic, human and other-than-human meaning-making assemblages that

embody 'the peculiar unity and persistence of the liminal' (Pelton, 1980: 105). From a Deleuze-Guattarian or new materialist perspective, conscious as well as unconscious exotica are spectral tricksters; pedagogical demons that assist in the conjoining of mind and body, nature and culture, life, and non-life. Tricksters literally help us to change our minds, drawing our attention to the fact that, as Viveiros de Castro points out with the aid of trickster-laden Amerindian cosmology, there can be no 'spiritual' or 'mental change which is not also a bodily transformation, a of bodily affects and capacities' (2015: 255). As Deleuze writes, it is a peculiarity of demons and tricksters to 'operate in the intervals ... to leap over the barriers or the enclosures, thereby confounding the boundaries between properties' (1994: 37). 'What we encounter' when we encounter spectral exotica are demons as 'sign-bearers: powers of the leap, the interval, the intensive and the instant' (1994: 37). As Chantelle Gray explains, what Deleuze's demons and tricksters do is to counter 'the Cartesian method of premeditated thinking' by 'deterritorialising dogmatic images of thought or habitual ways of thinking' (2020: 131), and provoking a kind of learning that takes 'consciousness' into 'experimentation' and 'field[s] of continuous intensities' (2020: 132).

Tricksters and demons are potent pedagogical avatars that can deliver what Deleuze calls '*paideia*' – shock-therapy or 'violent learning' that counters programmatic/habituated thought (1994: 168). Cephalopods are particularly potent in this regard; as teaching aids they are transformative avatars of a new mode of learning – one in which thinking and acting are made co-extensive to one another. Cephalopods, like squid and octopuses, are conscious exotica. These spectral tricksters speak with their bodies, signalling their intent via an affective language involving chromatic signalling, skin texture variation, postures, and locomotion (Godfrey-Smith, 2016). Such multi-brained multi-limbed and many-hearted beings are like the tricksters of indigenous African lore that 'poke play with and shatter assumptions of origin and boundary,' nature and culture, mind, and body (Pelton, 1980: 105). In the peculiar fluid nature of their cognitive expressiveness cephalopods, like all tricksters, convey 'the peculiar unity' of the liminal; 'that which is neither this nor that, but both' (1980: 105). Cephalopods are the experimental subjects of new branches of AI and gene manipulation. They have an especially spectral agency in context of emerging cognitive algorithmic data networks and genetic engineering, urging us to pay attention to the neglected affected, embodied, and poetic experience of our industrially produced new materiality.

A speculative cephalopod pedagogy asks us to explore the sensual aspect of the multi-layered somatechnical experience in which contemporary humans are embedded, to give ourselves over, as Anthony Dunne writes, to 'intentional ambiguity,' to 'attune' ourselves to the 'strange and unfamiliar' trickster-like aspects of technological immersion (2005: 36-37). What if artificial algorithmic intelligence was cephalopod-like, learning human language via questing electromagnetic and algorithmic tentacles? What if algorithmic AI was sensually exploring us via multiple sensory devices (like the information-gathering questing tentacles of an octopus); CCTV cameras, screens, sensors, and smart appliances embedded in everyday domestic and workspaces? How could spectral tentacular trickster AIs touch us, exactly? Could they penetrate beneath our skin and infiltrate our internal organs? Could they reach into our being-human? As

they reach for and enfold us with their speculative algorithmic tentacles, could we learn them back, parse their touch, think their unthoughts and learn to speak their spectral language? These are questions that Adrien Tchaikovsky skilfully explores in his seminal *Children of Ruin* (2019), which plays on emerging AI studies in mapping cephalopod consciousness and bacterial computing onto machine networks.

Conscious exotica – animals with radically different body-brain plans to the human template yet possessing eerily analogous complex conscious processes – are not the only exotica we need be paying attention to. All forms of life, and increasingly digital forms of un-life, it turns out, possesses cognitive capacity – mostly of the non-conscious variety. The biosphere and the technosphere are positively riddled with ‘intelligent’ non-conscious cognitive networks. Even where consciousness, with its slow uptake and limited information processing ability, is present in a few isolated groups of organisms, survival – even human survival – depends almost entirely on non-conscious cognition. Everything we assume to be conscious processes, ‘including the detection and extrapolation of patterns, the integration of somatic markers into coherent body representations and the fusion of diverse temporal and spatial events’ is dependent on nonconscious cognition (Hayles, 2017: 87). Bacteria, cephalopods, and humans, in turns out, exist on a continuum of unthought. Adding the non-conscious to the consciousness/unconscious agential binary, cognitive biology aligns with the new materialist project of decentring the human and, I would warrant, takes it further. Yet, as Hayles continues, much work remains to be done – including in education – in recognizing and mapping the ‘particularly consequential forms of material agency’ (2017: 87) possessed by cognition – particularly of the non-conscious variety – as well as the radically divergent and contingent agential capacities that mark the cognitive spectrum.

By failing to take onboard the non-conscious, writes Hayles, we are operating under ‘a very partial and incomplete picture’ of materiality (2017: 86). Here too SF takes up much of the flack. Peter Watts’ *Blindsight* (2006), for example, extrapolates on the kinds of intelligent behaviour evinced by non-conscious networks, suggesting that what counts as normal cannot be sufficiently anchored by consciousness alone, or indeed by human cognition. Like Tchaikovsky in *Children of Time* (2016) and *Children of Ruin* (2019), Watts maps different kinds of cognitive material agencies, conscious, unconscious, and non-conscious as well as their differential agential capacities. Unlike Tchaikovsky, whose non-human agents represent an affirmative pluralistic relational posthuman ecology, despite their cognitive differences, Watts (2006) confronts the pressing problematic of unthought, imagining a radical outside to cognitive relationality – something utterly alien and incommensurable to human thought and science. In this project, Watts (2006) draws on cognitive biology, neuro-atypical neuroscience, and theory, making different theories of mind and evolution protagonists in his writing in a manner typical of SF.

Cognitive biology reveals a biosphere dominated by non-conscious unthought. Consciousness appears to be an exception rather than an outcome in evolution; one that carries heavy evolutionary penalties – as Anthropocene humanity is beginning to discover. As one of Watts’ characters ruminates, the idea of ‘normalcy’ alters when the heavy cost of consciousness

is considered: consciousness 'wastes energy and processing power and self-obsesses to the point of psychoses' (Watts, 2006: 302). In *Blindsight*, consciousness is revealed to be a complete outlier, and not only on Earth. Humanity fatally encounters a trickster alien race that can travel between the stars 'unhampered by self-awareness' (2006: 302). Humans are indeed alone; but not in the way they once imagined. In Watts' figuration, consciousness and its correlate of language are represented as inept evolutionary stratagems, rapidly weeded out in a universe dominated by unthought. This kind of speculative SF brings us into confrontation with anthropocentric assumptions about the primacy of consciousness and so-called reason. Confronted by a trickster Gaia, cognitive but like Watson's aliens unhampered by self-awareness, Anthropocene humans find themselves at an analogously perilous juncture, faced with an extinction-level event precipitated by our energy wasting, self-obsessed conscious doings. In such a hazardous milieu, 'whether consciousness is a crown or a burden, or both together,' must be re-evaluated by the new materialisms in the 'larger context of planetary [non-conscious] cognitive ecologies,' emerging non-conscious AI networks and perhaps, one day, newly discovered non-conscious exo-planetary ecologies as well (Hayles, 2017: 111).

Our bodies, endowed with colour perception, stereoscopic vision, and consciousness are not the only kinds of bodies that can think. We are reminded by Connelly that we humans are not as conscious as we'd like to assume; our brains, like those of cephalopods, are extended nervous systems that are given to 'side perceptions' that involve an array of infraconscious embodied perceptions that are not directly available to conscious processes (2010: 10). As Snaza explains: 'before any consciousness knows the body is perceiving something let alone interpreting it, it is already responding at a neurological level, which leads to shifts in both the affective system (in the sense of affects as something like feelings) and the body's motor capacities' (2019: 110). Hayles (1999) reminds us that consciousness is a relative latecomer to the game of cognition on planet Earth. There were thinking organisms like cephalopods on this planet long before humans or even mammals arrived on the scene, and undoubtedly non-human cognisers will still be around long after we humans have become fossilised sediments. Like cephalopods, we are constantly moving towards what we think. Even 'before we know we are sensing a thing, we are [already] moving toward or away from it corporeally, and we are being moved by it in the sense that our emotional or affective state is being modulated' (Snaza, 2019: 100). The dynamics of cognitive biology allow us to realise that affects, emotions and feelings are already a kind of knowledge. As Snaza (2019: 100) writes, 'it also seems to be the case that all knowledge in the sense of conscious cognition is belated, arriving on the scene in a certain mood that primes the body to think it'. By taking on board the non-conscious and conscious spectral tricksters of SF as speculative pedagogical aids we can begin to move toward a more open-ended pedagogy that takes on board the more-than-human world; in other words, a pedagogy that is alive to the uncanny and equivocal nature of this world that we share with a multitude of other thinking beings.

Conclusion: Turning the tide of ruination, extinction, and death

No matter where we look, we are confronted by uncanny spectres. Embroiled in a game of survival that is sure to become increasingly desperate, we are called upon to face, as de Freitas (2020) notes alongside Bruno Latour, the multiple trickster faces of that non-conscious network of planetary intelligence named Gaia. 'As progress falters,' the task of educators is to diffract together new scientific discoveries, speculative fabulation and 'the immanent onto-ethical and epistemological systems of Deleuzoguattarian and feminist new materialists [that] might enable us to recognize and implement new narratives that were previously masked by anthropocentric conceits and haughty Enlightenment-based notions of supposedly all-encompassing progress and linear progression' (Geerts and Carstens, 2019: 923). Searching for new modes of being and becoming, we will need to climb from one strange attractor to another in search of a better destiny – and not only for humanity. In the process, we will need the assistance of a variable trickster ontology that is able to merge the planetary with the specific, the geological with the biological, the conscious and the non-conscious, etc. While this article, in keeping with the open-ended spirit of fabulation, has focused only on identifying important speculative lines of flight for venturesome pedagogues, there are many resources for educators who are interested in more practical and focused pedagogical specifics. Snaza's *Animate Literacies* (2019), for instance, is a compelling study for HE pedagogues interested in generating an affects-based more-than-human pedagogy of bewilderment. Elsewhere, I extrapolate, with practical pedagogical examples taken from my own experiences in teaching, on 'key principles, by which we might come to a critical understanding of new materialist perspectives and their value for HE' (Carstens, 2019: 138). Here, however, my intention has been to come to a broader understanding of the some of the strange meaning-making figures and figurations mobilised in SF and SF-inspired theory that highlight the equivocal nature of our time of crisis. My argument has been to underscore the central premise of SF – namely, that we exist in an uncanny cosmos in which truths are flexible, equivocal and often radically contingent. This insight requires that we, as educators, take on more than one point of view simultaneously, while trying to find a productive and immanently ethical middle ground on which to found a meaningful and accountable Anthropocene-appropriate pedagogy (Geerts and Carstens, 2019).

The time for maintaining faithfulness to particular paradigms of meaning-making is, in any event, long past. In the game of reductive single-vision, evidence is often disastrously ignored because it does not fit predetermined models of thought. Consequently, data is invariably fudged, and opportunities and potentially productive new alliances missed. Deleuze and Guattari write that all assemblages – even a pedagogical ones – faces two sides: one side faces the strata, the 'organism or signifying totality,' while the other faces the 'body without organs' and its 'asignifying particles and pure intensities' (1988: 4). While our first impulse might be to reject outright the stratified, institutionalised face of meaning-making assemblages, leaning too heavily on the intense event-side, as new materialist theory often tends to do, ignores 'the necessary other side of the story, the forces of cohesion, encapsulation and level-specific dynamics characteristic of living beings' (Hayles, 2017: 71). A venturesome pedagogy, informed by

speculative fabulation will therefore need to pay close attention to forces of both cohesion and intensity, embracing lessons gleaned from evolutionary and cognitive biology as well as from indigenous meaning-making practices (see, for example, Carstens, 2017).

Contrary to what might be supposed, cohesion, encapsulation and level-specific dynamics are, in fact, the games of unthought (Hayles, 2017). Non-conscious life and even non-life, like pandemic-causing viruses and algorithmic data-mining networks, exploit them in complex networked ways that we as cognitive cognisers have only tentatively been able to grasp. Yet, as I have hopefully demonstrated, conscious reason – an evolutionary laggard in the game of cognition – is not the signifying totality that progress stories have led us to believe. Instead, it is belated, uncanny, and intensive. In its making-strange, SF merges both sides of the assemblage of meaning-making, taking in the conscious and the non-conscious, the intense, empathic and radically relational, along with the stratified and rational, while attempting to find a productive middle ground. This balancing act, then, is the task of a venturesome pedagogy; a task it will accomplish by bringing in, as I have argued, the meaning-making figurations of SF. To become adequate to a trickster reality of climate change and extinction, education will need to trouble the disastrous narratives of neoliberal progress in which it finds itself embedded. The motivation for undertaking a venturesome pedagogy of speculative fabulation could not be more relevant or urgent. As the tide of ruination, extinction and death begins to lap at our feet, pedagogues will need to cultivate new forms of noticing that are able to account for the multiple overlapping more-than-human histories and meaning-making configurations through which things, bodies, minds and ecologies are continually being made and unmade.

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