New Materialist Perspectives for Pedagogies in Times of Movement, Crisis and Change

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Abstract

Theoretical perspectives that are useful for a pedagogy – one that aims to be beneficial in these times of socio-economic crisis, environmental destruction and climate change – need to account for *materiality*. Our time – referred to as the *Anthropocene* (the geological age of man) or, perhaps more accurately, the *Capitalocene* (the age of global capitalism) – is a time of unprecedented material movements, crises and changes for all Earthlings. Given the scope of the crisis for life itself (the currently unfolding 'sixth extinction' of biological life) from which humans are not materially exempt, we are called upon to account for our materiality (as well as its effects and affects) in ways that take critically take stock of the 'microorganisms' and 'diverse species' with which we are co-constituted, the 'material artifacts and natural stuff that populate our environment' as well as the 'socioeconomic structures that produce and reproduce the conditions of our everyday lives' (Coole & Frost 2016:1). New materialist theories present us with ethical, epistemological and ontological ways of rethinking our teaching practices in order to make them more alive to the material world as well as to the enormous problems that are now besetting it. This theoretical paper aims to demonstrate why this is the case by providing a broad outline of new materialism and its pedagogical usefulness. First outlining the nature of the crisis that requires materialist intervention, it then presents some of the *topoi*, or key principles, by which we might come to a critical understanding of new materialist perspectives and their value for Higher Education and Extended Curriculum Provisions (ECP).

Keywords: Capitalocene, Anthropocene, Linguistic Turn, Materiality, Sympoeisis, Agential Capacity, Affect, Relationality, New Materialism, Ethico-onto-epistemology

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Introduction

Theoretical perspectives for pedagogies that aim to take matter and materiality onboard in ways that are critically appropriate to the Anthropocene/ Capitalocene can broadly be termed new materialist. While they are a pluralist enterprise, such perspectives are constructed around common themes – namely, the taking onboard of scientific foundations about the 'stuff' or materiality of the world, as well as the simultaneous problematisation of standard historical and scientific materialisms that are invested in the ideology of progress and the 'fantasy of the [human] subject's autonomous self-containment' (Schaefer 2015: 65). Instead of enforcing illusory conceptual gaps between the subject and object of knowledge or cutting up the world into discreet partitionings, new materialist interventions – whether termed posthuman, agential realist, vital materialist, etc. – seek to make connections between the vibrant agential and affective capacities of matter as well as the intermeshed entanglements of material things, objects and subjects.

In the process of making relational entanglement more visible, new materialist practitioners jump the fences erected between disciplines and areas of knowledge production, crafting ontologies and epistemologies that are premised on an ethics of immanence rather than transcendence. Defying what Donna Haraway (1991: 189) refers to as the 'god-trick' of Western-Enlightenment androcentric and anthropocentrically-invested modes of thinking-doing that are situated at one remove from the world, pedagogies premised on new materialist theoretical frameworks embrace an 'ethics of mattering' that takes stock of the 'radical historical contingency for all knowledge' whilst simultaneously making a 'no-nonsense commitment to faithful accounts of a 'real' world' (1991: 187).

For Haraway, this does not imply ditching scientific rigour, but rather paying close attention to the poison of metaphysical individualism that cuts us off from taking notice of human relationality. What educators and researchers need to impart, as Karen Barad, writes, is a sense of 'responsibility and accountability for the lively relation-alities of becoming of which we are part' (2007: 393). This raises the matter of eco-materialist views – evinced in the work of various thinkers that fall under the banner of the new materialisms (such as the forgoing, Stacey Alaimo, Elizabeth Grosz, etc.) – which are, as I argue, especially serviceable to the task of rethinking foundational pedagogies in relation to contemporary issues.

The Anthropocene/ Capitalocene Crisis

We are living in what has been termed the *Anthropocene*, 'a historical epoch of our planet during which human activity has become the dominant influence on climate, environment, geology and ecosystems' (Clarke 2018: 11). There is manifestly a calamity – 'the Anthropocene crisis' – that urgently necessitates new ways of thinking and teaching about ecology, materiality and relationality in ways that enable students to not only grasp the nature and scale of the crisis but also to think beyond it (Carstens 2016). A mere 200 years after its inception, 'globalised' industrial civilization has presented the world with several pressing socio-economic and environmental problems such as 'climate change, water pollution, the rapid disappearance of growing numbers of species … a desperate shortage of clean water for many people, enormous disparities between rich and poor' (Shotwell 2016: 111). There are also urgent problems for Higher Education. Reframing students as passive consumers of services and the recipients of narrowly defined market-orientated 'outcomes,' the neoliberal climate also smothers lecturers under perpetual performance reviews and personal development outcomes while, in the case of Extended Curriculum Provisions (ECP), guaranteeing them little in the line of job security or institutional visibility.

While many in ECP find themselves laboring on temporary contracts, their students face the 'no-future' prospects of the global marketplace, where the costs of living (and the chances of falling into a perpetual debt cycle) go up and up while the prospects of finding a decent job decrease with each looming financial collapse. Educational systems under neoliberal capitalism, as Mark Fisher (2009) observes in a disquieting account of his experiences as a lecturer in a Further Education college in the UK, perpetuate the psychic brutalities of the marketplace, circulating apathy, cynicism and mental agitation amongst students and teachers alike. Like Fisher, new materialist pedagogues insist that we should make the causes, conditions and outcomes of neoliberal capitalism more visible in our curricula (no matter what discipline is being taught, whether Arts or Science-based). These include the colonial eradication of indigenous peoples, the spread of industrial civilization with its world-changing technologies and inappropriate lifestyles, the perpetuation of inequality and the economization of a*ll* life (whether human, plant or animal) for extractive profit-driven motives. The outcomes of these interlocking motifs are dire indeed; not only have they produced terrible disparities amongst the world's human populations, but they have triggered a potential collapse of the planet's

carrying capacity for life. Finding ourselves 'shadowed by futures that will surely need repair', writes Alaimo (2016: 188), we are confronted with the necessity of forging critical teaching and research practices that preclude the taking of 'straight paths' – paths of progress and reductive reason that have led us to the trouble of the Anthropocene/Capitalocene. New materialist theories present ways of making our teaching practices alive to the world, offering a 'swirl[ing] together' of 'ontology, epistemology, scientific disclosures, political perspectives, posthuman ethics and environmental activism' and more besides (Alaimo 2016: 188). From a new materialist perspective, the contemporary world is filled with clarion calls for us to rethink the ways in which matter has been taught and thought.

The Anthropocene is only one of several proposed names for our current era of planetary crisis. An alternative, the *Capitalocene*, coined by Jason Moore, captures the role played by capitalism in the overarching reorganization of contemporary social, economic, and biological processes (Clarke 2018). 'Imagining the human since the rise of capitalism entangles us with ideas of progress and with the spread of techniques of alienation that turn both humans and other beings into resources', writes Anna Tsing (2015: 19), urging pedagogues to teach about progress narratives as well as the shared human/nonhuman precarities and vulnerabilities they have engendered. As Elaine Gan, Tsing and others point out in their seminal anthology of new materialist perspectives *Arts of Living on a Damaged Planet* (2017), in the Anthropocene/Capitalocene the task of reforming the ways in which we teach about the world is more urgent than ever: relationalities and 'living arrangements' – ecosystems, in other words, from the human microbiome (undone by artificial hormones and chemicals) to coral reefs and rainforests – 'that took millions of years [of biological evolution] to put into place are [now] being undone in the blink of an eye' (2017: G1). We are therefore urged to incorporate the nonhuman world of ecosystems, species and symbioses (as well as what makes them tick) into our teaching practices. In doing so, we can certainly begin to do something in our classrooms and research practices about tackling this industrially-produced ecological ruination (which is most certainly our own too). By 'rethinking relations among organisms and the metaphors by which we describe them', educational practices can help shift how we humans 'value other beings' and how we might re-orientate ourselves towards them (Hejnol 2017: G92). My argument in this paper is that new materialist theoretical perspectives provide critically important tools for

reconceiving ethical, epistemological and ontological questions and, in the process, making them more central to our pedagogical practices.

Coming to Grips with New Materialist Pedagogical Perspectives

While the forging of critical citizenship seems, at first glance, to be an unappealing remnant of Western Enlightenment-derived educational agendas, there is still much at stake in such an endeavour for Higher Education and ECP pedagogies that aim to take new materialist principles seriously. While fascism, xenophobia and profit-driven greed are making problematic inroads into contemporary global and national politics, capitalism, as Fisher (2009) writes discourages pedagogy from the task of producing critical subjects who can resist such moves. Under neoliberal regimes of power, he writes, Higher Education has been thoroughly monetised and managerialised, with students rendered into the passive 'consumers of educational services' (2009: 21). For these reasons, the notion of forging critical citizenship needs to be recuperated by educators as they strive to nurture nuanced, and more importantly, productive, social awareness in these Capitalocene times of change and crisis. Doing so, from new materialist perspectives, requires that pedagogues pay close attention to the ways in which the immaterial is entangled in the material, the societal in the environmental, the political in the ecological, the local in the global, etc.

Although there are varied new materialist genealogies, to my mind the work of Deleuze & Guattari – by insisting that ideality is not separate from but immanent to materiality – captures the gist of the shared ethos. Grosz (2017) writes that the pathbreaking work of these continental philosophers constitutes a radical departure from epistemological systems that privilege form over matter / subject over object. There are also shared 'onto-ethical' matterings 'at the heart of new materialisms, and in the tradition of Deleuze-Guattarian thought', writes Chantelle Gray (2018: 470), adding that in both, 'we find that categories previously deemed binary are now held to be part of a complex co-imbricated ontology'. By investigating how economies, ecologies, societies, languages, bodies and affects are entangled – not only with one another, but also with ways of thought, technological networks, ethical practices, nonhuman others, as well as diverse physical materials – Deleuze and

Gauttari's separate and collaborative work, especially evident in *A Thousand Plateaus* (1988), can be said to typify new materialist approaches aimed at building a critical understanding of how matter comes to matter. It is not amiss to claim, as Deleuze and Gauttari (1988) frequently do, that foregrounding material factors as well as fundamentally 'reconfiguring our very understanding of matter' are crucial responsibilities for a pedagogy that seeks to do more than peddle an economized 'service' (Coole & Frost 2016: 2) From such vantages, the task of educators is to take a stand against the contemporary growth of narrow-minded fascisms and morally-bankrupt economizing by 'supplying students with a 'plausible account of [material] coexistence and its conditions in the twenty-first century' (2016: 2). From new materialist perspectives, this means teaching students how to critically account for the material practices by which contemporary humans are implicated in material processes of world-building or 'worlding' with innumerable others.

While contemporary sciences (particularly the natural sciences) have started to move on from dangerously outdated worldviews, Higher education systems and ECP provisions (even in science-related education) are still promoting, often by default, the by now archaic Western ontology of a 'passive' world that humans can supposedly rightfully 'master' by studying law-like causal relations. New materialisms ask that educators work to undermine this fallacious anthropocentric ontology and epistemology, which persists in the ideology of progress that underpins industrial practices and marketised educational paradigms. There are clear ethical reasons for pedagogues to desist from promoting outdated world-views, along with treacherous systems of knowledge-production and neoliberal practice: if we persist in doing so, then we are actively complicit in the vast networks of inequality and planetary harm that these obsolete worldviews, praxes and skewed ethical modalities have produced. More crucially, as educators, we will have prevented our students from 'opening', ethically and immanently, to the 'unpredictable and indeterminate materialisations', that make up the world as well as from waking up 'to the growing uncertainties' of our existing 'geopolitical and socioeconomic structures' (Snaza *et al*. 2016: x). From new materialist perspectives, all living things – human or not – are powerful agential subjects and we are being urgently called upon to attend more ethically in our classroom practices to their capacities to affect and be affected, and to enter into assemblages with other objects, things and powers.

In their introduction to *Pedagogical Matters* (2016), Snaza, Sonu, Tru-

man and Zaliwska identify four general principles or *topoi* by which educators might come to an understanding of the new materialisms:

> (1) that we need to exhume materialities lost in a decades-long fetishization of texts and discourses by the so-called linguistic or cultural turn;
> (2) that education needs to be more attentive to developments in the contemporary life sciences;
> (3) that matter has some form of agency; and,
> (4) that entities do not precede their relations but rather emerge from them.

These principles are worth taking into consideration because, I argue, they can be directly related to ethical, epistemological and ontological concerns in Higher Education and ECP pedagogy. New materialist theories, as I demonstrate via examples from my own teaching, assist us in reworking these concerns into what Barad (2007) terms an integrated 'ethico-onto-epistemology' – a cohesive relational approach appropriate to the tangled material conditions of the twenty-first century.

Topos 1: Unearthing Materialities Lost in a Decades-long Fetishization of Texts and Discourses by the So-called Linguistic/ Cultural Turn

Insisting that there can be no unmediated access to 'nature,' the linguistic turn – dominant in sociology and other arts-based fields (including education) since at least the 1970s – has concerned itself with anthropomorphised idealities (such as language, discourse, culture, and values) while problematising any straightforward overture toward base matter or material experience (Snaza *et al*. 2016). While this turn, as Donavan Schaefer (2015:10) writes, succeeded in 'dismantling nineteenth century colonial hierarchies of the primitive and civilized', and therefore served as 'an important corrective to racist colonial logics', it also enshrined a 'Kantian logic that traffics in linguistic fallacy' by reestablishing an archaic Greek fiction that 'language is the medium of power and the primary analytic locus' of all cultural and scientific discourse. While new materialisms attempt 'to give material factors their due in shaping society

and circumscribing human prospects' (Coole & Frost 2016: 3), the linguistic or cultural constructivist turns in theory appear to have deprivileged materiality altogether by reducing bodies, cultures, economies, religions, pedagogies to 'a network of discursive regimes' (Schaefer 2015: 112). New materialist theories, by contrast, are more interested in the 'dynamic interplay between language, sensing bodies and things in the world' (2015: 112). Yet, as Elizabeth Wilson (2015) writes even when they explicitly deal with bodies, much of existing feminist, sociological and pedagogical practice continues to rely on 'methods of social constructionism, which explore how cultural, social, symbolic, or linguistic constraints govern and sculpt the kinds of bodies we [humans] have … [while] tend[ing] not to be very curious about the details of empirical claims in genetics, neurophysiology, evolutionary biology, pharmacology or biochemistry' (2015: 3). Shaeffer, like Wilson, urges pedagogues toward explorations of 'histories that start before texts: phylogenetic histories originating with prelinguistic bodies – including non-human bodies – driven by forces outside of language' (2015: 11).

New materialist perspectives and practices call upon pedagogues to account, in their praxes, for how human bodies fall within a field of animality and shared human/nonhuman vulnerabilities. This is a perspective that necessitates responses orientated toward an ethics of immanence. Grosz suggests that moving the attention of our students away from the ethics of 'discreet individuality' promoted by the linguistic turn (and by Western discourse as a whole) towards one of immanence or radical relationality necessitates paying close attention 'to the pre-human [and] the inhuman' world of animals and affective relations; a process that will enable both educators and their charges to discover surprising new 'human ways to invent and create' (2017: 259). We are urged to ethically consider and teach about human subjectivity as the effect (and affective play) of 'broader, largely disavowed, plays' of power relations as well as nonhuman agencies, and to think of these 'others' – whether human, cosmic or geological force, microorganism, animal, plant, insect, material artifact, chemical toxin, radioactive isotope or affective assemblages of emotive intensity (such as fear/repugnance or love) – as agential and political 'entities toward which we must be ethically and politically orientated' (Coole & Frost 2016: 6). Rosi Braidotti (2013: 92) urges pedagogues of all stripes to orientate their practices in accordance with an ethics of immanence that takes up Deleuze & Guattari's 'vitalist' call to construct a pedagogy of 'mutual trans-species interdependence'. Constructed

around principles of 'ecosophy', Braidotti calls for pedagogues to make connections between 'the multiple layers [both human and nonhuman] of the subject, from interiority to exteriority and everything in between'.

The ECP course that I teach explicitly takes up Braidotti's invitation to set up a relational ecosophic pedagogy. Beginning the year with an exploration of the origins of the material human body and human society in processes of cosmic, geological and biological and cultural evolution, it proceeds via a series of readings, short films, and class discussions that explore the human body and human society not as a cultural, political and scientific object, but as a dynamic relational assemblage and human and nonhuman components. Local nature-poet Ian McCallum's easily digestible trans-disciplinary ecosophist musings in *Ecological Intelligence: Seeing Ourselves in Nature* (2005), as well as Anthony Synnot's accessible *The Body Social* (1993) provide some core readings, which I supplement in lectures with some carefully explained new materialist insights. Judging by enthusiastic student responses, there is indeed much pedagogical use-value in teaching the human body as part of a nonhuman continuum (along with other bodies and material forces). Schaefer explains that 'it is not only other human bodies that our bodies need, but the array of materialities [both] living and nonliving, that make up animal life-worlds' (2015: 100). For myself and my students, the opportunity to 'see ourselves in nature' is both deeply sensuous and ethical. As we have discovered, discourse and language can be redirected away from the fiction of discreet individuality and mobilised towards a vision of 'the self' as 'part' of the world, instead of 'sovereign, alone and transcendent' (2015: 112). It is indeed affectively liberating to discover that we are all Earthlings – 'material bodies, existing on a single plane of substance; 'a plane of immanence' in Deleuze-Guattarian terms, alive with transformation' (2015: 101). What a thrill it is for myself and my students to discover that all bodies (human and not) possess a capacity for 'activity and responsiveness' (2015: 101) and to realise that all bodies (both human and not) are driven by 'compulsions', as well as 'historically derived complexities' of powers that either constrain or liberate them (2015: 103).

Topos 2: Education Needs to be More Attentive to Developments in the Life Sciences

While the first topos challenges pedagogues to develop an ethical stance of

radical relationality and immanence, the second foregrounds epistemology. Braidotti (2013) writes that new materialist theories challenge longstanding Western humanist presumptions about *what* being human means and *how* it is that humans come to know and relate to the world. These are epistemological questions that new materialism frequently approaches from the context of developments in the sciences. Haraway, for example, (2017: M29) finds herself 'undone and redone by the New Synthesis' now unfolding in contemporary biology – 'an intellectual, cultural, and technical convergence' that she finds best exemplified by the figure of biologist Lynn Margulis who, aside from her pathbreaking scientific work on *symbiogenesis* (co-evolution), was also a 'peerless and much-loved teacher'. As 'an adept in microbiology, cell biology, chemistry, geology, and paleogeography, as well as a lover of languages, arts, stories, systems theories, and alarmingly generative critters', Margulis' work as both scientist and pedagogue embodies, for Haraway, precisely the kind of transdisciplinary ontological and ethical engagements that new materialism foregrounds as fundamental to the task of pedagogy, no matter what the discipline being taught (2017: M27). If new materialist approaches towards pedagogy can be summed up in a single word, then it would, as Haraway (2017: M25) suggests, be '*sympoeisis*' (literally, 'making-with'); 'a word proper to complex, dynamic, responsive, situated, historical, sociological and ecological systems … a word for worlding', a concept central to what it means to know in the twenty-first century, and therefore central to the task of Higher Education.

'It is not so difficult to love nonhuman life, if gifted with knowledge about it', writes biologist E.O. Wilson (2004: 134). With this sentiment in mind, a carefully chosen chapter from Wilson's *The Future of Life* (2004), worked through in lectures with carefully explained insights from Margulis, Haraway and the example of cephalopods (which will shortly be discussed), helps my students think through invisible networks of microbes, fungi, and invertebrates (in soils and animal microbiomes) as well with as the radically entangled bacterial/plant/animal relations that sustain the Earth's ecosystems and biosphere. Working through these biological epistemologies is challenging – particularly for ECP students seeking to enter Arts and Law-related fields. Many lack biology as a high-school subject and most struggle, initially, to grasp why thinking with knowledge from the life-sciences – or epistemology in general – could possibly be relevant. Yet – based on exceedingly high levels of class participation, good reading-comprehension test scores, as well as

enthusiastic responses to essay topics such as 'thinking with the Gaia hypothesis' – this difficult work is also, in the end, unexpectedly affirmative and pedagogically rewarding. The gusto of my students is hardly surprising. E.O. Wilson (2004: 134) writes that our ability to 'know the world intimately' and pleasurably, as well as our 'capacity and the proneness to do so, may well be one of the human instincts – *biophilia* – defined as the innate tendency to affiliate with [and derive affective pleasure from] life and lifelike forms'.

What does it mean to know when, as cognitive biology shows, cognition, communication, information processing, computation, learning and memory can be seen at work in bacteria, plants and diverse 'lower' animals (Hejnol 2017)? A favourite classroom stratagem of mine is to help students think about epistemology from new materialist perspectives with the aid of cephalopods. These astoundingly beautiful photogenic, performative and curious creatures (octopi, squid and, cuttlefish), possess bodies that are really extended nervous systems (or extended brains, to be precise, without a wholly centralised executive processing unit). Amazingly, they live completely outside of the usual body/brain divide assumed by Enlightenment science to be necessary for intelligence. Moreover, they illustrate the absurdity of the Cartesian dictum (*cogito ergo sum*) that not only assumes that thought is not materially bound, but privileges brains over bodies, ideality over materiality, and intelligence-possessing humans over all other forms of life (Ponting 2007). Until recently, many cognitive theories, as historian Peter Watson (2001: 702) writes, viewed 'higher intelligence' (the possession of episodic, procedural and semantic memory) as the exclusive provenance of certain 'higher' mammals (namely, humans) endowed by Darwinian evolution with a 'reptilian core' (the seat of basic drives), 'a paleomammalian layer' (the seat of emotions) and a 'neomammalian brain' (the seat of reasoning, language and other higher functions). Significantly, intelligent cephalopods possess *none* of these centralizing organs of consciousness; instead, their 'brains' are extended nervous systems distributed throughout their entire bodies (Godfrey-Smith 2016). Despite having diverged from the evolutionary branching that produced reptiles and mammals over 600 million years ago, cephalopods exhibit extremely complex learning, adaptive and linguistic behaviours on par with so-called higher mammals (Godfrey-Smith 2016: 41). Cephalopods can be viewed as avatars of new materialist theories that emphasize the vibrancy of material bodies and the immanence of ideality and materiality. While they are 'material objects', relegated to purely mechanistic being by Cartesian science,

cephalopods with their 'body-brains are protean, all possibility' (Godfrey-Smith 2016: 76). Although they are 'the closest we are likely to get to meeting an intelligent alien' (2016: 200) they are also cognitive kin that remind us that epistemology, as Sadie Plant puts it, boils down to an 'epiphenomenon of fluid transmissions within and between all organisms' – a marvel with deep oceanic origins (1999: 249). The cognition of all living things, including bacteria, 'evolved in the ocean' and 'the Earth and its oceans made the bodies of all critters', including humans, whose 'water-filled cells bounded by membranes still carry remnants' of that entangled oceanic origin that all earth-life shares in (Godfrey-Smith 2016: 200).

From new materialist perspectives, singular, reductive and deterministic stratagems (including those of science) could never account for the full variation of the world's becoming. What this means in classrooms is that other ways of knowing – both human and nonhuman – must be considered and brought into conversation. All of earths creatures, including humans in all their diversity 'relate, know, think, world and tell stories through and with other stories, worlds, knowledges, thinkings, yearnings', writes Haraway (2017: M45), adding that sympoesis and symbiogenesis should *not* be the exclusive ambit of life science classrooms (if, in fact, it has even made it into such classrooms at all), but should be the focus of pedagogies in all fields of knowledge production. Sympoeisis, she opines, is about crafting 'a more venturesome, experimental [and inclusive] natural history' that includes creative synergies and classroom conversations between indigenous ways of knowing, nonhuman intelligences and all manner of poetic, artistic and scientific modalities (2017: M45).

Topos 3: Matter has Some Form of Agency

The third topos, entangled with the first two, is related to ontology, or the sense of 'being' in the world. Scientific discoveries in physics and biology have revealed that 'materiality is always something more than mere matter: an excess, force, vitality, relationality, or difference that renders matter active, self-creative, productive, unpredictable' (Coole & Frost 2016: 9). New materialism, rather than reserving ontological agency to humans, vigorously asserts the power of all living matter to act or possess agential capacity. Even immaterial 'things' are seen to possess a kind of relational agency or vibrancy.

In sum, new materialisms ask that we 'recognize that phenomena are caught in a multitude of interlocking systems and forces and consider anew matter's capacity for agency' (Coole & Frost 2016: 9). From a Deleuze-Gauttarian perspective, being is always co-constituted in relation to, or in 'alliance' with, multiple others, both human and nonhuman; being is never specific or remote but engaged in perpetual processes of becoming – 'a verb with a consistency all its own' (Deleuze & Guattari 1998: 238-239). In short, ontology, from new materialist perspectives, is inextricable from agential capacity and processes of becoming/worlding. Jane Bennet, working on such a premise, theorises 'a vitality intrinsic to materiality' – proposing a kind of vibrant materialism that seeks 'to detach materiality from the figures of passive, mechanistic, or divinely infused substance' (2010: xiii). Such shifts necessitate more complex ways of thinking about causality, change and the boundedness of material (and, in fact, even immaterial) entities or agencies. In classrooms, 'encounters with lively matter' – as my examples of teaching with McCallum's *Ecological Intelligence*, Wilson's *The Future of Life* as well as cephalopod cognition attest – might help to 'chasten fantasies of human mastery, highlight the common materiality of all that is, expose a wider distribution of agency, and reshape the self and its interests' (Bennet 2010: 122).

Iris van der Tuin (2014: 232) writes that the 'past considered ontologically [is] a condition of the passage into the living present'; a present in which we, if guided correctly, might come to think of ourselves as agential beings differently. Animated by such hopes, one section of my syllabus explores the brutal history of Western civilization and the ideology of progress in a manner that seeks to install a more affirmative counter-ontology based on sympoeisis. Assisted by class discussions enlivened by carefully explained new materialist principles, prescribed readings by popular environmental historians like Clive Ponting (2007), Jared Diamond (2004) and Ronald Wright (2005) supply the necessary background information. Students are asked to write critical essays on topics such as 'the problem with progress' and 'the allure of consumer capitalism.' During this section of my course students move away from conceiving the presence of the biological past and engage with the continuation of certain cultural pasts via progress narrratives, colonial/capitalist power-regimes and a Western consumer aesthetics of 'conspicuous consumption' that are centuries in the making.

Alaimo (2018: 188) writes that the world of contemporary consumer capitalism is a world filled with 'strange agencies', in which 'banal objects'

such as smartphones, or even 'toothbrushes, plastic bottles, plastic bags, food containers, children's toys, and so forth' can be seen to possess 'weird', and sometimes even 'malevolent' powers. As Alaimo explains, and as I discuss with my class, consumer objects and practices have interesting implications for the contemporary situation (and sensation) of being in the world, raising significant questions about the future of agency and ontology. A chapter taken from Peter Watson's *A Terrible Beauty* (2000) on the information revolution in genetics and computing (as well as the heady debates it has sparked around questions of race, cognition and autonomy), helps my students to come to terms with some of these questions. As Patricia Ticinto Clough (2007: 62) points out, and as I debate with my students, these questions have bounced back at us, 'opening the human body' as well as human cognition and its metaphorical stratagems 'to matter's informational substrate, drawing on the bio-informatics of DNA in biology, or quantum theory's positing of information as a form of measure'.

Haraway (2017) and many other new materialist science-scholars have made much of recent attempts by cognitive biologists to assign ontological agency (the correct biological term is 'onticity') to *all* biological beings and even to adaptive systems such as ecosystems. This is something that we need to actively explore in our pedagogies. 'Onticity' might already, or perhaps very soon, extend to include 'intelligent' machines and adaptive machine networks. Relational agency, therefore, seems a good way of thinking and teaching about (or, rather *with*) things and objects. 'Thinking as [and about] the stuff of the world', as ourselves and our students should be doing, 'entails thinking in place, in places that are simultaneously the material of the self and the vast networks of material worlds', suggests Aliamo (2018: 187). Regardless of their apparent material intransigence, objects (even inanimate ones) are never completely unyielding. The journey of plastic bags and cellphones, for instance – from environment-trashing resource extraction processes, exploitative sweat-shop labour practices to consumable items (via vast pettifogging supply-chains) – make for compelling classroom storytelling. Texts such as the final chapter of Jared Diamond's *Collapse* (2005), an article by Elizabeth Kolbert called 'The Age of Man' (2001) and Jennifer Baichwal's haunting documentary, 'Manufactured Landscapes' (2007) helps me do this grim work with my students. Given the manifest dangers – the malevolent agency of microscopic plastic particulates, agricultural pesticides, and chemical poisons as they travel down food-chains into human and nonhuman bodies – these are

essential classroom conversations to be having. As Isabelle Stengers (2015: 134) writes, the Anthropocene/Capitalocene challenges us to foreground ontology in ways that problematize the financialisation of life, the 'boredom' of non-innocent consumer addiction, as well as the frightening agency of contemporary humans; to talk, in our classrooms, about 'erosion, pollution, contamination, a monstrous accumulation of garbage, and of course a massive loss in biodiversity ... [which] tell, and will go on telling about us in a far-away future measured in geological time'.

Topos 4: Entities do not Precede their Relations but Rather Emerge from Them

The last topos embraces the first three and encapsulates the ways in which we might think and teach with a new materialist ethico-onto-epistemology. No matter which way we turn in our pedagogical practices, 'we find ourselves entangled with the world, and thus our ontology, our knowing relations, and our ethical orientation and practice are all invoked in action', writes Alexis Shotwell (2016: 116). If, armed with curiosity, intelligence and the right cues, we start digging around on the 'information super-highway,' (as I encourage my smartphone savvy students to do), we discover numerous online accounts of highly concentrated radioactive materials and plastic particulates making their way up food chains, enacting genetic mutations, bodily deformations and planetary-system changes as they go. We discover, to our horror, that humans, even highly individualised ones in ivory towers, are not magically innocent or free of all this messiness; a situation I explore with my students with the assistance of a fascinating open-access article by sociologist Andrew Jones called 'The Next Mass Extinction: Human Evolution or Human Eradication' (2009). Nils Bubandt (2017: G135-136), in an equally fascinating transdisciplinary discussion around Indonesia's anthropogenic Lapindo mud volcano, captures the gist of Jones' narrative when he writes that the present moment – the moment of Anthropocene/Capitalocene – 'invites us to imagine a world in which an alien geologist from the future detects in the strata of the ground evidence of the presence of humans long after they have gone extinct … opening up to a retrospective reading of the current moment, a paleontology of the present in which humans themselves have become geological sediments or ghosts'. Students are fascinated by the temporal and agential entanglements enacted by such narratives and experience a tremor of fear when confronted by

Jones apocalyptically-tinged discussion of impending annihilation. When asked to write a final essay that debates the relationship between capitalism and extinction, they often respond with startling passion. Many, to my great delight, succeed in articulating the fallacy of believing that 'things' – whether human, mud volcano or petroleum company – are free from the relations, sometimes damaging, they form with other things or forces. Nor is it all that difficult for many of them to grasp, in broad strokes, that entities like plastic bags or cellphones do not precede their relations but rather emerge from them. Objects, 'things' and bodies – the material 'stuff' of the world – as Haraway insists, are always and already 'actors and agents' of their own in relation to the knower (1997: 592).

Barad (2007) has drawn several important lessons from twentieth-century experiments in physics. She proposes that, learning from these developments, we consider entities as 'intra-active' as opposed to interactive. Subatomic physics has revealed that entities are not actually separate things that then enter into relations but rather that all entities emerge from relations. 'Each intra-action matters', she writes, 'since the possibilities for what the world may become call out in the pause that precedes each breath before a moment comes into being and the world is remade again, because the becoming of the world is a deeply ethical matter' (2007: 185). This foregrounding of the radical relationality of all things has been given many names in new materialist theories – *transcorporeality* (Alaimo 2016), *intra-action* (Barad 2007) and, of course, *sympoesis* (Haraway 2017). These theories, in turn, draw strongly on developments in the natural science and physics, as well as on the groundbreaking vitalistic ontology developed by Deleuze & Guattari in their combined and separate oeuvres. All of these approaches share in common a turn toward scientifically rigorous accounts and shifting, complex ontologies whereby entities are not conceived of as stable, bounded things but as assemblages of human, nonhuman, organic, inorganic, material and immaterial components.

Feminist new materialist scholars such as Grosz, Haraway and Barad urge us to leap across subject boundaries in our teaching practices by, for example, including literary, sociological, anthropological and philosophical narratives in our engagements with the sciences (and vice-versa) in order to reveal radical relational entanglements. No-one can argue, for example, that science doesn't have social implications or, in turn, is unaffected by economics. Although most institutions tend to view trans-disciplinary courses with distaste, nothing prevents lecturers from taking up transdisciplinary

engagements in their classrooms, forming research groups to debate these matters (or from doing the legwork on their own, if needs be). There are also countless online and offline resources at the disposal of pedagogues who wish to explore the contours of the new materialisms. Alaimo's *Exposed* (2016), for example, transverses a multitude of fields from science and ecology to marketing and public relations. Transcorporeality, as she explains by exploring the multiple interconnections between bodies, societies, cultural practices, substances and environments, is a way of bringing together social-justice and environmental-justice concerns as well as research methodologies and teaching practices that 'perforate the borders that demarcate the human as such' (2016: 77). Many of the art-science and eco-social activisms that Aliamo (as well as Haraway 2017) discusses furthermore suggest compelling new uses to which social and other digital media can be put and thought about in classrooms.

Undeterred by the trouble of tackling difficult theory with her reluctant undergraduate class, Elspeth Probyn (2004: 36) wonders, 'how does one or could one teach theory, and especially theories of embodiment, in ways that engage the curiosity, the intellect and the emotions of students?' Her simple 'fairly low tech' solution – an affect-laden reworking of a standard large-classroom situation, much like my own – is worth quoting (2004: 36):

> In my huge undergraduate class I can be much 'larger' than in a small seminar. It is incredibly freeing to be in front of 450-odd bodies comfortably seated and awaiting a show. I'm well-miked – with a lapel mike so as to wander – and I'm prepared with fabulous a/v material. I demand and command attention, peering into all those eyes. Gestures can and need to be big. The wonder of technology allows me to throw my voice and to intimately inquire of the girls at the back if they're having fun, or to tell them to shut up. The outlines of the theoretical points are on the overhead, and have been posted beforehand on the web along with salient quotes. This fairly low-tech support acts like parallel bars in gymnastics – as the underpinning allowing for the controlled display of a body in movement. Bad jokes, shared laughter and a complicity between teacher and students, and amongst the students themselves, allows for the contagion of the interest-excitement affect

New materialist educators like Probyn propose that we should seek ways of

productively entangling the local with the broader relational frameworks of environmental, social and economic contexts, while teaching modes of knowledge that are accountable, embedded, passionate and purposeful. Shotwell, for instance, writes that 'climate change, water pollution, the rapid disappearance of growing numbers of species … a desperate shortage of clean water for many people, enormous disparities between rich and poor', are only some of the crises of entangled human/non-human embodiments arising from 'capitalist modernisation' that need to be critically explored in classrooms (2016: 111). As I observe elsewhere, 'our students are more aware of these issues than we might think; what they want is for us to teach them *how* to engage with these difficult entanglements' (Carstens 2016: 267). The purpose of a responsible pedagogy, as Alaimo (2016: 172) suggests, is to provide 'artful representations of realities that are not usually visible due to the scalar extremes and privatisation of space' in standard capitalist pedagogical systems and institutions that stress 'science, business, engineering and operational efficiency', while completely 'undervaluing' and neglecting the skills that are necessary for critical citizenship, such as 'philosophical reflection, ethical consideration, social and political analyses as well as literary musings'.

Conclusion

Deborah Bird Rose urges us to teach 'that the world is *not* composed of gears, cogs' and discrete objects – as it is still typically taught in many classrooms, 'but of multifaceted, multispecies relations and pulses' extending out in all directions and scales (2017: G55). She invokes the Yolngu word *bir'yun* or 'shimmer', defining it as one's 'capacity to see [the] ancestral power' of things, 'which call upon us to bear witness [to them] … to tell more truthful accounts' of their relations as well as to 'radically rework our forms of attention' towards them and the assemblages they form or might yet form (2017: G55). It is only in their shimmering vitality that the bodies, things and powers of the world allow us to approach them in all their protean multiplexity. As Jane Bennett (2015) correctly observes, reductive science's claims about the discrete nature of the 'things' of the world constitutes only one of many rhetorical stratagems for knowing the world. New materialism, by contrast, urges pedagogues to counter human reason and its will to singular truths by rallying against the 'hubris of human exceptionalism' and affirming the 'vitality or creative [relational] power of bodies and forces at all ranges or scales' (Bennett 2015:

233). As Evelien Geerts (2019) writes, we are urged by the new materialisms to 're-think what is traditional and canonical' by working towards a 'pedagogy that is centred on critique and creativity, situatedness, geopolitical (self-)awareness, accountability, and an immanent ethical attitude that takes current-day political constellations and complications into account'.

While, as Gan, Tsing and others (2017: G1) write, 'the enormity of our present dilemma leaves many scientists, writers, and scholars in shock', or worse, in denial, there is still a chance to turn to tide of ruination, extinction and death if we pay attention, in our pedagogies, to 'the traces of more-than-human histories through which things, bodies and ecologies are made and unmade'. Shifting as our awareness of these matterings are, along 'a broad interdisciplinary front fraught with linguistic as well as conceptual complexities', it is new materialist philosophies with their nuanced understanding of rhetoric, argument and interpretation, that are well positioned to take us forward. The question now is whether pedagogues in Higher Education can engage with and foster the forms of noticing that are now urgently required. The new materialisms, as I have contended throughout, can show pedagogues how to productively hone research, metaphors and teaching stratagems as well as to suggest methodologies for facilitating transdisciplinary classroom conversations that are critically appropriate to the situation of the Anthropocene/ Capitalocene. Pedagogues in all fields, as Bennett writes (2015: 234) are being called upon by the new materialisms to 'respond intelligently' and timeously to the most disturbing of all events – 'signs of the breakdown of the Earth's carrying capacity for life'.

'Staying with the human trouble', as Rose writes (2017: G55), means that we *not* drop human 'cruelty' and our 'capacity for seemingly endless and wildly indiscriminate killing' out of classroom conversations'. 'At the very least', she continues, 'we who have not yet been drawn into the vortex of violence' and death-dealing of the Anthropocene/Capitalocene 'are called to recognise it, name it, and resist it; we are called to bear witness and offer care' (2017: G55). Yet it is not only our obvious and unique cruelty – towards members of other species, as well as to members of our own – that requires pedagogical redress but, above all, our poisoned and often quite passively assumptive hierarchical relations to the things, bodies and powers of this world. Gone, in any event, is the anthropocentric comfort of nature as boundless cornucopia, endlessly bestowing, free of charge, 'her' gifts to 'man.' Hierarchical fictions, neat divisions between subjects and objects, as well as

reassuring lines in the sand between past, present and future temporalities have all evaporated. In Anthropocene educational spaces, as Brubant (2017: G136) writes, 'the present proceeds from the future, because the possibility of co-species survival [in the future] depends crucially on what we [educators] are going to do *now*, [in the present], in the midst of an increasingly [historically] given fate of ruination and extinction'.

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