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Editorial

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Abstract

Present conditions of living for human and more-than-human lives are presenting difficult scenarios for an adequate development of the world's own becoming. We are living in a permanent state of pandemic waved by a series of periods that fluctuate past, present and future in order to establish a new regime of power based upon the fiercest biopolitical power that Foucault (1978) could have had envisioned back in the seventies. If January 2021 started with an enfleshed materialization of Margaret Atwood's The Handmaid's Tale with the assault of the United States Capitol, June 2021, the international pride month, is manifested in Spain with a brutal homophobic assassination of Samuel, a young gay man who was in a videocall with a friend and the one year and five months detention of Patrick Zake (a postgraduate master student in the Erasmus Mundus GEMMA program) in Egypt for defending human rights internationally. This permanent state of alarm is focusing global attention to a particular health condition, which is COVID-19 but, at the same time, it is disregarding many other affections that humans and more-than-humans are suffering from. Not only the many other health diseases that keep on infecting and pandeming non-Western countries, but also the diseases that are affecting our environment as the Australian fires claimed on their own in 2019, or diseases that have to do with communicative practices as the spreading of fake news.

What all of this shows us is the need to keep on diagnosing how a dynamic entanglement of biopolitical powers is introducing new hierarchical power structures that reconfigure pedagogies, arts, discursive-material cultures, and the organization of life in general. The need to look for new political figurations is becoming even more

evident and looking for modalities (Colman, 2019) able to respond (Haraway, 2008) to certain risk conditions is brought to the forefront. As an ethical "wonder" (Stengers, 2011), we need to start reconfiguring the questions that are going to make the powerful uncomfortable (Schostack & Schostack, 2008). New materialisms need to provide an aesthetical imagination able to map contemporary genealogies (van der Tuin, 2015) that articulate new narratives (Tamboukou, 2015) in order to encounter "differences that matter" (Ahmed, 1998). All in all, we need to find "vibrant textualities" (Moslund, Marcussen & Pedersen, 2020) able to engage with configurations of the world as singularities, and not as mirroring cause and effect, processes that aim at dismantling matter in favor of a global representationalist move towards the hegemony of an abstract global citizen, or in words of two the contributors of this issue, we need to "view difference as an essential aspect of a functioning ecosystem" (Kronberger & Krall, p. 44).

One of the vibrant textualities that this special issue introduces is, at the same time, the introduction of one section of the journal that is "Sciento-metrics" by one of its co-editors, Elizabeth de Freitas. The section "sciento-metrics" is co-edited by Dagmar Lorenz-Meyer and the author of the first article and, according to their own definition, it looks for "innovative and methodologically creative new materialist scholarship engaging the potentialities of mattering/measuring that open up different histories and futures of phenomena of concern" (Matter: Journal of New Materialist Research, n.d) One of these innovative methodologies that the section and the article provides is the relationship between mathematics and matter. Combining the disciplines of philosophy (via Quentin Meillassoux), mathematics (Fernando Zalamea and Giuseppe Longo) and computer science (with Gregory Chaitin), de Freitas establishes the main objective of the section that is reconfiguring the relationships between mathematics and matter in order to provide new methodological processes. The article, and the section launched in this fourth issue, has as its primordial aim to "seek ways of studying human mathematical habits, often conceptualized in sociological, philosophical, and psychological theories, as part of an earthly, worldly, and even cosmic mathematical ontology" (p. 4). Speculation in mathematics provides certain processes of linear cause and effect that determine one type of androcentric methodology able to produce hierarchies between different living conditions, as well

as socio-cultural material practices that engage with determined networks of power. Coming back to our prior example, a modality (Colman, 2019) based on a mathematical speculation of necropolitics is reigning global and local politics contemporarily through COVID-19 pandemic. Additionally, what de Freitas' paper proposes and establishes for the section as well is a very important debate engaging with agential practices and human responsibilities in the world we are living, that is situating ethically the human in the phenomenon under research. In her words, "[t]he capacity to mathematize does not belong to humans, although it is uniquely expressed in human habits of making models, simulations, measurements and other engagements with metamorphic mixtures" (p. 20).

As it was stated at the beginning of this editorial, another important fact in the assessment of contemporary phenomena is the role of aesthetic practices in configuring ethical methodological approaches. If the role of the human as part of the methodological entanglement is important, so are the material configurations that specific engagements produce. This is one of the issues that Alisa Kronberger and Lisa Krall bring up in their article. Pursuing a transdisciplinary approach as the one presented by de Freitas above, they combine Karen Barad's quantum physics with contemporary feminist approaches to art. They bring in the importance of touch as a non-androcentric approach in the encounter between different disciplinary backgrounds. Their objective is to illustrate Barad's diffractive reading and agential realism through the artistic practice of patchwork. Dividing their article into different patches, they introduce the work of three different artists: Katherine Behar, Morehshin Allahyari and A.K. Burns and the encounters they find with Baradian theory. Likewise, they question themselves "how can diffractive thinking be expressed in artistic works and what strategies do artists pursue to do justice to a Baradian form of critique?" (p. 34), to which they answer with a very common practice in new materialist thinking, that is affirmation (Dolphijn & van der Tuin, 2012; Braidotti, 2014; Revelles-Benavente, 2017).

A different way to think about artistic practices is presented by David Ben Shannon and his proposal to engage with research-creation through Whitehead's concept of propositions. Shannon explains how "proposition" is often used in this methodological approach without considering one of the ontological concerns of the concept itself,

that is the binary opposition between truth and false. In order to break through this dichotomy, he proposes to look at truth in terms of modality, as a speculative propositional truth. Introducing as an example the Walking Scoring Device, Shannon (p. 63) explains how this methodological approximation "creates a space for the possibility of restricting certain potentials (sounds) to a particular encounter (the walk with the device)." Again, we are queering measurements (as in de Freitas' article) by opening potentials while, at the same time, restricting them, or in Shannon's words, finding strategies to do justice to non-androcentric ways of thinking, ways to prevent "nostalgic fantasies" (p. 71).

Along the lines of configuring this new materialist practice of doing theory and situating human practices is the article brought in by Chris Julien. Bringing the genealogy of the Baradian conceptualization of the apparatus through Foucault's dispositif, Julien introduces theory-making within the world, by situating the concept within ecological studies. Julien (p. 77) defines the apparatus "as both a writing -and a living practice; not in opposition to, or separateness from the world, but as a generative mode of habitation" to be "both accountable and response-able in terms of its environment." (p. 77). Detailing the distinction between Baradian "agential cuts" and "cartesian cuts", Julien elaborates on the problems of representationalism and the exclusion of the environment in Foucault's definition of "dispositif". Perhaps, at the core of new materialist theory in general, and Barad's agential realism in particular is knowing the outside of a particular phenomenon in order to limit a very specific object of research. Julien's article sheds light precisely on this point through the concept of "ecologising" that "secure[s] the modern author function, collapsing the premise of non-accountability and irresponse-ability that is arguably prevalent among modern patriarchal, colonial and capitalist machines." (p. 97).

The last two articles of this special issue take another detour in theory making and focus a bit more on the methodological practices that illustrate how new materialist theory is put into practice (Dolphijn & van der Tuin, 2012). Mónica Cano's article focuses on our pedagogical practices, which have suffered a radical change during the last year because of the pandemic. Maria Tamboukou, co-editor of the section "quantum mapping", focuses on how narratology theorizes women's experiences.

Mónica Cano uses as a point of departure a course that she is teaching "Vulnerability, Gender and Justice" in order to show how the concept of "vulnerability" and "diffractive methodology" can help students to move away from normativity. Drawing upon "affective pedagogy" (Hickey-Moody, 2016; de Riba, 2020), she embraces vulnerability as "the condition of possibility of being affected." (p. 103). The genealogy that Cano offers in order to understand how these pedagogical practices work in the classroom draws upon a feminist philosopher who has been, at times, neglected in new materialist theories that is Judith Butler. Offering the distinction between a universal vulnerability, understood as a necessary interrelation between human beings, and a situated precarity, which is understood "as the lived body experiences [...] through its exposure to others and the world" (p. 111), she configures a rhizomatic experience of her own interaction with the students at a university in Vienna. The process of being affected involves a self-opening that positions our feelings in the front of our own subjectivity. Thus, if we want to establish an affective relation with our students, we necessarily need to position our vulnerabilities up front, opening the door to unpredictability. In other words, she applies a rhizomatic pedagogy without "try[ing] to assimilate systems of thought but is rather attentive to open-ended and constant conceptual transformations." (p. 117) Voicing vulnerability and precarity helps us to create "safe spaces" (Colman & Stapleton, 2017) in which social transformation can take place.

Last, but not least, Maria Tamboukou offers an illustration on how particular methodologies enflesh theory making taking as an example Gwen John's letters and her relationship with her many cats, invoking Deleuze and Guattari's "becoming-animal". These letters are important because they are able to "offer rich insights in the minutiae of a young woman artist in the urban spaces of modernity" (p. 132). Tamboukou analyzes the correspondence between John and her lover (Rodin) and one of her friends in order to illustrate difference "as an ontological condition between humans and non-humans" (p. 134). Doing so, she is not only following one of the premises of new materialisms, that is to put theory into practice as aforementioned, but also illustrating the importance of enfleshing data and treating it as a dynamic component of the research process. Additionally, she departs from everyday experience, as some other articles in this issue use, manifesting the need to depart

from the embodiment of subjectivities as Deluzian and Guattarian "assemblages". This will help to construct an ethical and respons-able world, as Cano's article demands.

The almanac section introduces three different concepts in the toolbox of new materialist vocabularies: "synaesthesia" (by Helen Palmer, co-editor of the section "Creating Language and Theorizing literature"), "phenomena" (by Sofie Sauzet) and "slime" (by Esther Leslie). The issue exemplifies how "phenomena" has been part of the new materialist thinking almost from its beginning, and for the reader, considering phenomena as an introduction to new materialist vocabularies might be surprising (in an ironic way). Nevertheless, what is innovative in Sauzet's entry is the genealogy that she offers for the conceptualization of phenomena (drawing upon rationalism, phenomenology and finally post-humanism) and the three different scenarios that she offers to show how it works. Leslie's "slime" is used as a fictional metaphor (Haraway, 1991) in order to understand how matter can perform with multiple surfaces and effects. Using the "triviality" that this object has, she analyzes contemporary society and the unequal hierarchies that are structuring it. To conclude with this section, Palmer puts in the toolbox that this issue offers the term "synaesthesia" as a portal to define sensory modalities (Colman, 2019), following up the transversal definition that Shannon offers of modalities in his article. Synaesthesia is a catalyst for experiencing modality as the multiplicity of connecting fields of perception.

The intra-view section comes with a very up-to-date topic that is "touching". As it has been demonstrated, in this pandemic times "touch" is one of the most important actions as a matter of (dis)connecting more-than-human elements (spreading the virus, (dis)connecting human care, problematizing digital realities and also bringing together different disciplines). One way or another, all the articles have indirectly provided a very particular definition of touch. For instance, Julien's article describes "Touching oneself—in a flash [...] as connect[ing] the apparatus to itself while simultaneously constituting it as part of a particular, living environment (p. 94). An artistic project based on the "glove" is the spinal bone of the dialogue between Swantje Martasch and Felipe Duque, members of the project "New Dawn". According to them, the globe "enables an attitude" (p. 180), it even marks different social classes as the

example they offer of working in a fast-food franchise. As Cano explains in this issue, the glove materializes our own vulnerability and not only "to one another but also [to] institutions and economic, social, and cultural relations." (p. 112)

Finally, the issue closes with three affirmative reviews that touch upon the three pillars that are transversal to all the articles presented in this issue: that are theory making, embodied knowledges and methodological practices. The first one is the review offered by Mar Sureda of the book New Directions of Philosophy and Literature, an edited monograph by David Rudrum, Ridvan Aeskin and Frida Beckman. Following the importance of aesthetics (as de Freitas explains in her article), Sureda invites us to think how the intersections between philosophy and literature re-configure the very definition of both disciplines, thinking through the transversality that is implicit in new materialisms. The second review is offered by Shiva Zarabadi of the book Placemaking: A new Materialist Theory of Pedagogy, written by Tara Page and included in the Edinburgh book series in New Materialisms edited by Iris van der Tuin and Rosi Braidotti. Zarabadi focuses on the importance of place, positioning the author (as Shannon explains in this issue), and embracing our vulnerability (as Cano does in her contribution to this issue). Engaging with the environment (as Julien claims in this issue) becomes crucial in order to perform a new materialist pedagogy sensitive to difference and multiplicity. The third, and last, one is written by Rocco Monti: Derrida after the end of writing: Political Theology and New Materialism by Clayton Crockett. This innovative insight introduces Jacques Derrida within the genealogy of new materialisms by analyzing his late writings. Using a diffractive methodology (as the majority of the articles in this issue do), the author of the book puts together Derrida's theory of writing with Barad's philosophy of science.

Alice Walker showed the importance of patch work in her short story "Everyday Use". Using the artistic metaphor provided by two of the contributors of this issue, the team of Matter would like to invite the reader to see this fourth issue as a patchwork that symbolizes theory for "everyday use". Walker (1973) explained to her readers the importance of performing history in our quotidian practices in order to intra-act past and present to provide for different futures. In this issue, the articles, almanac entries, intra-views and affirmative readings predicate on the need to theorize from within situated phenomena in order to achieve tools able to reconfigure the agentiality of

matter. This issue shows how matter is mathematical, artistic, propositional, an ethical apparatus, affective pedagogy and, above all, everyday experiences. The combination of these elements can help to create innovative methodologies based upon affirmative practices able to undo the global state of pandemic in which human, and more-than-human beings, suffer from their own precarity.

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Mathematics in the middle:
The relationship between measurement and metamorphic matter

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Abstract

This paper revisits philosophical questions regarding the relationship between mathematics and matter. I briefly present four contrary and contemporary perspectives on the speculative force of mathematics, as a provocation for further discussion on the subject of sciento-metrics. I first consider the ideas of the philosopher Quentin Meillassoux, as a way of setting the stage for various kinds of materialist philosophies of mathematics. I then turn to the ideas of two mathematicians - Fernando Zalamea and Giuseppe Longo - and a computer scientist - Gregory Chaitin - and explore how their discussions of contemporary mathematical practice offer important insight (and twist) regarding the relationship between mathematics and matter.

Keywords

Mathematics; speculation; science; realism; Meillassoux; Longo; Chaitin; Zalamea.

Introduction

In 1960 the scientist Eugene Wigner (1902-1995) wrote a controversial paper called "The unreasonable effectiveness of mathematics in the natural sciences" (Wigner, 1960). Wigner's paper was read as problematically positing a kind of magical or transcendent role for mathematics, in its capacity to describe and predict physical phenomena. Wigner suggested that the accuracy of mathematical formulations was an epistemological "miracle" indicating that the "laws of nature must already be formulated in the language of mathematics" (Wigner, 1960) [1]. He claimed that mathematics involved the free creation and manipulation of concepts, and its "appropriateness" was a "wonderful gift" in a complex chaotic world with little regularity and invariance. Notably, as Jose Ferreirós (2018) points out, Wigner was an important figure in developing effective mathematical methods for quantum physics, which involved shifting from the classical calculus to new algebraic 'group methods'. By the 1930s many physicists resented the displacement of the calculus, which cranked out actual solutions, for the more abstract structural approach of modern algebra and its meta-level patterns. They were concerned that the new goal of physics had become the search for compelling algebraic models and super symmetries and had lost touch with the bedrock of empirical reckoning. This "plague of groups" or "group pest" infestation, transformed the everyday practice of physics (Ferreirós, 2018).

Wigner's perspective on "the unreasonable effectiveness of mathematics" seems to have also been inspired by the turn to axiomatics and formalist qualitative methods, led by David Hilbert (1862-1943), and perhaps by his involvement in the Manhattan Project, and the development of the Atomic bomb. This 20th century mixture of modern algebra, axiomatics, war efforts and quantum science forms the background for his 1960 essay. [2] Wigner's suggestion of a hidden mathematical language yet to be fully translated suggests that matter is encoded or scripted by symbolic form, and humans

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[1] He attributes this perspective originally to Galileo.
[2] It was John Von Neumann (1903-1957) who spurred Wigner on to apply group theory to quantum mechanics and the two went on to participate in the Manhattan Project and the development of the Atomic bomb (Scholz, 2006).

are the interpreters who are more or less skilful at deciphering it.[3] The Anthropologist Vicki Kirby (2011) is critical of approaches that either mystify mathematics as miracle or treat mathematics as pure language game detached from the real. She argues that each is characterized as anthropocentric: the first imagines that the earth is there to serve humans, whose magical mathematics aims to control it (reductive scientism, or mathematical deism); the second imagines that the earth is beyond reach and un-encounterable, cloaked in a cultural veil of human mathematics (social constructivism). Kirby suggests instead an approach that dethrones the anthropocentrism of these two traditions, and seeks a new empiricism that remixes mathematics and matter:

> Measure would then not *only* be the anthropocentric habit inscribed in Protagoras' aphorism 'man is the measure of all things' nor reflect a unique human capacity. Instead, measure would be a tendency or potentiality of matter. Geometry, for instance, would be a more material mingling of *geo* and *metric*. For Kirby, too much of socio-cultural theory forecloses this possibility by defining geometry against geology, language against matter, mathematics as a *representation* that codes matter from without. (de Freitas, 2016a, p. 656)

Kirby (2011) provokes us to consider corporeality more generally as 'calculating and thinking material through and through' so much so that the *very nature of corporeality* is 'to mathematize, represent, or intelligently take measure of itself' (p. 63). She demands that we reckon with the way that matter and measurement are part of a metamorphic mixture, open to remixing, reformulating, and altered modes of bodying. This ensures that mathematics remains in the world (rather than transcends it) and emphasizes a pluralist new materialist mathematics. Accordingly, mathematics remains part of the metamorphic mixture of matter, and cannot detach itself from the world, to rise above, as inert, static, and apolitical.

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[3] Philosophers of science have spent centuries discussing matter-mathematics mixtures, often using the term 'realist' to characterize the belief that the mathematics is 'out there' in some empirical sense, or that mathematics "inheres" in the physical world. These claims are usually contrasted with alternative appeals to formalism or idealism, both of which detach mathematics, in different ways, from the material world. There are epistemic and ontological dimensions to these positions, and variations have emerged over the decades (see Benacerraf & Putnam, 1964 and Tymoczko, 1998 for foundational work. For instance, Nancy Cartwright has argued for a pluralist realism, insofar as she contests the law-like nature of mathematics-physics relationships, in favour of a "capacity" that inheres in the "dappled world".

In this paper, I explore recent proposals for rethinking the ontological mixture of mathematics and matter. I discuss thinkers who engage closely with the specifics of mathematical practice, whilst keeping the ontological question about mathematics and matter front and center. I examine four contemporary perspectives on the nature of mathematics, as a provocation for further discussion on the topic of sciento-metrics, which is the title of the section launched with this issue of the journal. I first consider the ideas of the philosopher Quentin Meillassoux, as a way of setting the stage for various kinds of materialist philosophies of mathematics. I then turn to the ideas of two mathematicians - Fernando Zalamea and Giuseppe Longo - and a computer scientist - Gregory Chaitin - and explore how their discussions of contemporary mathematical practice offer important insight (and twist) regarding the relationship between mathematics and matter.

My aim is to highlight the distinctive insights of each of these four thinkers, regarding the material practice and speculative reach of contemporary mathematics. All four attend in different ways to the onto-epistemic foundations of mathematics, focusing on either the speculative power of mathematics or the corporeal-material dimension of mathematical activity. For Meillassoux, mathematics is essential in framing his "speculative materialism" and pursuit of the absolute necessity of contingency, while Chaitin presents himself as a modern Pythagorean, and reads contemporary mathematics through computing machines. Zalamea follows a Peircian pragmatist approach, tracking conceptual transits across the field, and Longo defends the interval and the continuous as fundamental modes of mathematical materiality. There are affinities between these approaches, in that each draws on contemporary mathematics for insight into socio-material problems, but they also differ significantly in where they place the human. I am interested in how we might tap their insights and cobble together a new materialist philosophy of mathematics so that questions about human mathematical ability might be considered in the context of a broader post-humanist opening onto the mathematiz-ability of the world. In other words, I seek ways of studying human mathematical habits, often conceptualized in sociological, philosophical, and psychological theories, as part of an earthly, worldly, and even cosmic mathematical ontology. The distribution of mathematical ability across complex ecologies opens up the debate about mathematical ontology in new ways,

links to current concerns about algorithmic contingency, and urgently demands fresh insight from the post-humanities. I briefly survey these four approaches here, so that we might consider the distinctive ways they pursue the speculative power of mathematics.

Speculative mathematics

Although Wigner (1960) saw the empirical success of mathematics as following "the empirical law of epistemology", he also avows formalist foundations for the free play of mathematical ideas. Hilbert's formalist program was felt far and wide, but especially in modern algebra, where the speculative and generative force of mathematical invention was strongly evident. One can see in the new coupling of physics and algebra in the 1930s, the emergence of new conceptual mixtures that are in some strong sense entirely unimaginable from within past mathematics. In this way, we might use the term 'speculative mathematics' as a stand-in for hypothetical or inventive mathematical ideas, the kind of activity that brings forth a *new* mathematical object and then builds a somewhat altered and robust mathematical theory around it. But if the 'speculative' is to mean more than hypothetical and creative within a given discourse, and instead designates something with more of an ontological bite, then we need to consider its implications.

The metaphysical 'speculative' is typically used to reference pre-Kantian philosophies that allowed themselves the freedom to speak about that which was beyond the reach of human knowledge. Pythagorean declarations that "all is number" come to mind – this is a speculative declaration which sounds an awful lot like dogmatic metaphysics, and precisely the kind of mysticism which Kant's project critiques. And yet the "ontological turn" we have witnessed across the post-humanities suggests that there are new metaphysical urges all around us, as well as keen interest to map the power of the speculative. If, as some claim, we are now breaking with the long legacy of Kant and his insistence on the filtering faculties of human judgment, which disallow any 'real' encounters with the world, or in the least updating this notion of a filtering faculty in more-than-human terms, it seems rather important that we take up and discuss proposals for the speculative reach of mathematics.

In *Après la finitude* (2006/2008), Meillassoux argues that post-Kantian *correlationism* (between thought and being) undermined the speculative import of mathematics. He points to the "Galilean revolution" in scientific method in which mathematics became central to Western science when the world was newly understood and accessed through its mathematizable qualities. Many historians point to this revolution as the founding of contemporary science. The aim for Meillassoux, however, is to show how the Galilean revolution, which decenters the human within the solar system, entails a mathematizing of the world that bore within it the "possibility of uncovering knowledge of a world more indifferent than ever to human existence, and hence indifferent to whatever knowledge humanity might have of it" (Meillassoux, 2008, p.116). It is precisely this mathematization of nature, or rather the possibility of this mathematization, that gives purchase to scientific statements of fact about the world *prior to or after humankind*, according to Meillassoux. In other words, there is a certain facticity to the world that is larger than human knowledge, but that subsumes human knowledge precisely because of its speculative tendency. Mathematical science effects a radical decentering – *"the decentering of thought relative to the world within the process of knowledge"* (Meillassoux, 2008, p.115). It is this "within the process of knowledge" that substantiates facticity that is not merely correlational or conditional on the human faculties.

If Kant's critical project was meant to expose the naivety of previously dogmatic speculative philosophies, in which empirical fact and metaphysics commingled without adequate policing of the conditions of knowledge, he also shut down the speculative force of science itself. Meillassoux sees the Kantian critical project as a kind of therapy, a solace meant to comfort humans and alleviate their anxiety in the face of the radical decentering of human thought achieved through the *speculative character of scientific knowledge*.[4] Thus the *speculative* is precisely what achieves a "non-correlational mode of knowing" in empirical inquiry, a kind of knowing that is *more than human* insofar as it refuses the Kantian conditions of knowledge (Meillassoux, 2008, p.119). The tragedy for philosophy, accordingly, was to abort the Galilean scientific revolution and follow Kant, wrongly denying the speculative import

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[4] He states that his work answers the question: "How is a mathematical science of nature possible?" - a science that avoids the metaphysical and the correlationalist? (p. 128).

of scientific knowledge in encountering the real, denying the robust capacity of the world to be multiply-mathematized (mathematiz-ability). Philosophy erred towards Kantian transcendental idealism, when it should have invested in the speculative nature of mathematics and science, pursuing what Meillassoux calls a "speculative materialism".

This kind of materialism is often aligned with philosophical realisms, like that of Graham Harman.[5] For Meillassoux, who prefers to not use the term realism, mathematical statements are the best way to plug into the absolute *necessary contingency* of the world, and it is this emphasis on "necessary contingency" that can make them speculative in their scope. The concept of contingency is key for rethinking the way in which mathematics and matter are mixed. Note that Meillassoux is focused on *absolute* contingency rather than mere *historical* contingency, and he dismisses probabilisms and aleatory reason, for totalizing the possible. He turns away from probability and towards set theory, stating: "the most powerful conception of the incalculable and unpredictable event is provided by a thinking that continues to be mathematical – rather than one that is artistic, poetic, or religious. It is by way of mathematics that we will finally succeed in thinking that which, through its power and beauty, vanquishes quantities and sounds the end of play." (p. 108). In other words, he propounds that contingency comes in two modes, the first is finite/historical (captured by probability) and the second is the Cantorian 'transfinite': *the first is an empirical contingency that refers to the precariousness of any given mathematization*. The second is an *absolute contingency that asserts a non-being that may never be realized*, but is elaborated in particular mathematizations.

Meillassoux (2008) is not arguing for the absolute truth of mathematics, but for "the absolute scope of mathematics" (p. 125-126). And this is meant to grant mathematics a certain autonomy in its grasping tendencies – in other words, it can go beyond any human constructed correlation between world and model. This philosophy is not

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[5] Barad's commitment to a relational ontology might seem to put her squarely in the target zone for Meillassoux's critique of the correlationists, but since she breaks with 'social constructivism' and human exceptionalism, and she explores the acausal world of quantum field theory, I think there are ways to consider these as kindred projects in certain aspects. See also Dolphijn & Van der tuin (2012) and de Freitas (2017). The role of mathematics in various agential realisms, such as Karen Barad or Bruno Latour, is not as well developed as it is in Meillassoux, although Barad (2007, 2017) seeks to show how the world may be investigating itself mathematically, how creatures "do mathematics" not as algorithmic rule-followers, but as more-than-human "thought experiments"(Barad, 2017, np)

about a mathematics that *determines or encodes* the world, but rather the claim is that *the world possesses an inherent capacity to be mathematized*. It's crucial to state loudly that the term "mathematizability" does not and cannot designate a pre-given particular mathematics waiting to be actualized. In some sense, mathematics actually safeguards the necessity of contingency. He makes this explicit when stating: "Whatever is mathematizable can be posited hypothetically as an ontologically perishable fact existing independently of us. In other words, modern science uncovers *the speculative but hypothetical* import of every mathematical reformulation of our world." (Meillassoux, 2008, p. 117). Notably, mathematics partakes of the linked ontological tendencies of the hypothetical, the necessary, and the speculative.

Meillassoux convincingly argues that post-Kantian critical philosophy, despite the good work of this project in fighting the ideological dogmatism that underpins metaphysics, has become a kind of "skeptical fanaticism". In contrast, he shows how *speculation* is not a regretful or negative act of straying from the real, but rather accentuates and affirms thought's capacity to become radically alien. This approach links with but diverges from the ideas of Badiou (2006) who emphasizes the capacity of mathematics to make thought alien or non-human. I think the project of Meillassoux is helpful in its attempt to *defamiliarize* mathematics, and to consider its potential as a radical worlding process unto itself. Below I discuss his focus on the Cantorian transfinite, and I revisit the contribution of Galileo, to explore corporeal questions about matter-mathematics mixtures.

Foundational tendencies

Galileo's revolutionary contribution was that he coupled mathematics with *motion* in ways that furnished a scientific dynasty and a frenzy of *mathematizing* (Johnson, 2008). This is philosophically important for a number of reasons, most significantly because the revolution (a collective achievement) broke with the Aristotelian and Euclidean dictum that separated the mathematical concept (as concept) from time and motion (Châtelet, 2000). The mathematics of motion – accurate or otherwise – plays a highly significant role in any historical account of the relationship between mathematics and matter. Galileo's seminal inclined plane experiment, for instance,

centered mathematics in the study of motion, and was considered by many historians to be emblematic of the emerging mathematical paradigm of European experimental science (Gribbin, 2002). The experiment, as recounted in 1638, sets a bronze ball rolling down a carved groove along the length of a 20 foot-long piece of wood. Chalk marks were made at equal distances along the piece of wood, and a water-clock was used to measure the time when the ball passed each of the chalk marks. Each time the ball passed a chalk mark, the amount of water was removed and weighed; the measurement of time was equated to the measure of the weight of the water.

Many have debated whether and how Galileo actually produced this empirical result. In the 1950s the historian of science Alexandre Koyré argued that there were so many sources of error that it was dubious that Galileo had actually performed the experiment (Koyre, 1977)[6]. How could he have measured time intervals that were a fraction of a second? But in the 1970s, historian Stillman Drake examined unpublished Galilean documents and found some that clearly indicated an experiment had indeed been performed. In response to Koyré's criticism, and based on archival evidence, Drake (1975, 1978) surmised that the measurement of time was achieved using music and not a water-clock. He argued that musicians and conductors divide time into equal portions with great precision for long periods of time without thinking of seconds or any other standard unit. He pointed out that a conductor "maintains a certain even beat according to an internal rhythm, and he can divide that beat in half again and again with an accuracy rivaling that of any mechanical instrument" (Drake, 1975). Using a simple tune that had two beats per second, Drake himself demonstrated how you could mark the location of the descending ball at the second beat of the rhythm and refine the marks after a few trials. Measurement of the various distances travelled during these two-beat counts revealed the effect of gravity on free-falling bodies.

This story is telling for a number of reasons. Drake shows how the actual empirical act of investigation involved space as a function of time (equal beats of time are used to show differences in distance). Thus he shows how time is the engine of the experiment, the independent variable. But more pertinent to the argument of this paper, is the fact that the most compelling explanation for how Galileo actually

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[6] Notably, Wigner (1960) references this research.

completed this seminal experiment involves the human body and its tacit engagement with duration and rhythm. We see the strange marriage of number and time that infuses the act of experimentation and measurement. Of course the act of measuring is implicated in the findings, but what Drake shows us about this experiment is not simply that facts are produced through human intervention; he points to the force of time as that which animates matter, and he shows how Galileo plugs into the rhythms of corporeal duration – in all their multiplicity and modulation – in order to perform his experiment. This perspective resonates with other historical accounts of developments in physics and mathematics, such as those discussed by Gilles Châtelet, which has informed my work on sympathetic coordination in mathematical behaviour (de Freitas et al, 2019). Châtelet (2000) looks historically for the emergence of new mathematical diagrammatic gestures over the centuries, tracking the "physico-mathematics" of human invention. With reference to Galileo, he writes:

> At first sight this physico-mathematics does appear to be an axiomatic giving precise form to the system of equivalence between mathematical concepts and physical concepts. To understand the revolutionary coup that installs this axiomatics is to discover the proximity of two horizons made up of virtual determinations which exceed the current set of explicit determinations and which still remain available for examination. Conceived as an apprenticeship, as a Promethean impulse, and not as a combinatorial manipulation of beings-in-the-world, or as an 'abstract game', mathematics necessarily fulfils itself in physics. It is in these terms that we should understand Galileo's audacity in daring to bring the boundary forms of pure geometry into contact with the world of moving bodies (Châtelet, 2000, p. 4).

And yet for Meillassoux, perhaps following his early mentor Badiou, the interest in a mathematics-matter mixture lies in the set-theoretic foundations of mathematics. In other words, he doesn't dwell in the material practice of a physico-mathematics, but instead turns to set theory and its role as a *foundation* ("condition") for the speculative reach of mathematics and the speculative power of knowledge. He seeks the speculative force of mathematics in the capacity of set theory to render the infinite,

rather than in the processual nature of materiality. He will summarize the speculative import of mathematics in the following two claims:

1. "Every mathematical statement − precisely insofar as it is mathematical − *is not necessarily true, but absolutely possible*." (Meillassoux, 2008, p. 126, italics added,). That is to say, mathematical statements are not *necessarily true*, since such a claim would be a form of speculative idealism, and would pander to a kind of reductive logic, while Meillassoux is interested in a *speculative materialism*. And so he claims that mathematical statements are instead *absolutely possible,* because they operate as hypothetical systems structured through necessity, in a world of absolute contingency.

2. For Meillassoux, some mathematizations are better than others insofar as they substantiate the nontotalizability of worlds. There is one particular mathematical theorem that both exemplifies and assures the speculative import of mathematics. This theorem comes from Georg Cantor's (1845-1918) attempts to refine the methods of mathematics using set theory. This a theorem "that allows us to maintain the non-totalizability of the transfinite" (Meillassoux, 2008, p. 127). For Meillassoux, this theorem must be considered both absolute and unconditionally necessary. As such it then ensures that we do more than embrace the contingency of the world, but instead grasp the *necessity* of contingency. *Mathematics in this instance is an activity that affirms the necessity of contingency.* Cantorian mathematics helps us resolve Hume's problem of empiricism, with an ontology that emerges through the principle of unreason or factiality. It is the mathematics of Cantor's set theory, and his "detotalization of the possible" (p. 110), that answers Hume's problem. The "super-immensity of the chaotic virtual" cannot be measured by any number, finite or infinite (p. 111); The laws of nature are stable *for no reason*.

I want to suggest that this way of conceiving the speculative import of mathematics both helps and hinders our efforts to think about mathematiz-ability. On the one hand, I understand Meillassoux's project as an attempt to affirm the (limited) truth value of human science, while denying the privilege or right to claim that such knowledge is a mark of human achievement. We cannot claim correlationist truth nor metaphysical truth. Cantorian mathematical knowledge emerges in the material world and is not

only a human constructed knowledge, capable of thinking the speculative outside of thought. Humans are simply lucky (or unlucky) to comprehend the material world – stability of natural laws is not necessary, but is the case. Scientific practice can achieve this feat, if it avoids the probabilisms of aleatory reason, because it is an inherently mathematizing kind of activity that can dethrone the human subject and detotalize number. That being said, it follows that there might be worlds where science does not flourish, worlds found perhaps in certain examples of "extro-science fiction", but these seem rather impossible to conceptualize (Meillassoux, 2015).

The 'materialism' of this speculative materialism might seem rather thin to those thinkers focused on the materiality of mathematical practice. For instance, one might look more carefully at mathematical practices for how they engage a sort of free intensive force in the 'batter itself' that can morph into various forms of measure. This perspective brings us back into the mess of material practices and minor mathematical gestures, back to the kind of close reading that Gilles Châtelet performed, when seeking examples of inventive physico-mathematics. Despite the importance of foundations, I think the absolute scope of mathematics should be evident in diverse mathematical practices, rather than only evident in the famous Cantorian method for marshalling the transfinite. I suspect that the mathematics of non-totalizable worlds probably also lives in more mundane and minor mathematics, not as a 'correlational' concession to humans, but as an expression of an indifferent world which we encounter contingently. We cannot just bracket chance, for absolute contingency. We occupy a chance-inflected embodied event coordinated in such a manner so as to partake of mathematical worlds. This is a fortunate commingling that allows particular bodies, perhaps more than others, to indulge in or enjoy scientific knowledge as it evolves. In the next section, I turn to two mathematicians – Zalamea and Longo - who critique what they surmise is a continued fascination with philosophical 'foundations' in work like that of Badiou and Meillassoux, when contemporary mathematical practice reveals more about worldly mathematiz-ability.

Metamorphic mixtures of matter-meaning

Fernando Zalamea offers an aesthetic image of contemporary mathematics that I think seems fairly well-suited to an agential, lively and speculative materialism. Although Zalamea's book *A synthetic philosophy of mathematics* (2009) is very much a book about great (mostly white male) mathematicians, the overarching claim is that these people have succeeded in plugging into a metamorphic mathematical potentiality that joins their activity into a collective effort. Collaboration across mathematical communities occurs through "the exceptional protean capacity" of mathematics itself. The book proposes a "transitory ontology" for mathematics, and pursues a "continuity" between the phenomenal, the ontic, and the epistemic. This is a mathematics, according to Zalamea (2009), that is attentive to shifting and temporal unfolding, to gluing the global with the local, to tracking the "asymptotic webs of truth" across diverse conceptual developments (p. 142).

According to Zalamea (2009), collaboration across mathematical domains reflects the unity of mathematics, but also entails the emergence of new objects that constantly tear the field open. He offers a series of case studies, and claims:

> The unity of mathematics expresses itself, not only in virtue of a common base upon which the All is reconstituted (set theory), but – before all else – in the convergence of its methods and in the transfusing of ideas from one to another of its various webs. The penetration of algebraic methods into analysis, itself subordinated to topology, the ubiquitous geometrization of logic and the structural harmony of complex analysis with arithmetic, are all examples in which mathematics' global unity can be perceived in its local details. (Zalamea, 2009, p. 36-37)

Zalamea describes the field of mathematics in terms of fluid mixture – in discussing a whole raft of examples of mathematical developments, he uses words like "decantering", "pouring", "transfusing" "filtering", "saturating" and "distilling". Hence his attention to the ways in which the ideas transit from domain to domain, and metamorphize as they do. He argues that the radical transformation of mathematics in the 20th century, due in large part to the mathematician Grothendiek's hugely influential algebraic methods, which emerged from group methods, intellectually corresponds to changes in physics, with the development of

relativity theory. Any philosophy of mathematics worth its salt, he argues, must examine advanced mathematics and he reviews a set of philosophers and mathematicians who do that – such as Lautman, Badiou, Maddy, Cavaillès, Châtelet, Wilder, de Lorenzo, Polya, Lakatos, Maclane, Rota, Patras, Corfield, Tymoczko, Kitcher, and Kline.

Zalamea's project is very much a *process* philosophy of mathematics, intent on refusing a static or absolute idealism whereby mathematical concepts transcend and detach from the spatio-temporal world. In the case of Grothendieck, he finds what he calls a "practice of a relative mathematics" (p.140). This approach breaks with a static "absolute" mathematics ("in the style of Russell") and develops an image of mathematics in transition, so that the very concept of invariant becomes unanchored and relativized, as he engages with a register of universals that are said to be capable of unmooring themselves from any 'primordial' absolute. He supports these claims with reference to the particular technical practices employed: "In a technical manner, both Einstein and Grothendieck manipulate the frame of the observer and the partial dynamics of the agent in knowledge." (Zalamea, 2009, p.141).

He describes Grothendieck's method as involving a:

> web of incessant transfers, transcriptions, translations of concepts and objects between apparent distant regions of mathematics, and secondly, an equally incessant search for invariants, proto-concepts and proto-objects behind the web of movements (Zalamea, 2009, p. 141).

Insofar as this is the creative force of Grothendieck, it is also for Zalamea a method of plugging into a "reticent structure" or "proto-geometry" that is in the batter itself, so to speak, articulated through the method that Grothendieck called "sounding out" (p. Zalamea, p.152). Grothendieck will state that "One of my passions has been to name the things that discover themselves to me, as a means of apprehending them … this is not at all to fashion or build structures … It is rather to express, as faithfully as we can, these things that we are in the midst of discovering and sounding out …" (Grothendieck in Zalamea, p. 152-154).

Thus the transit of mathematical knowledge is not simply an exchange but also onto-generative "sounding out" – a transit of knowledge is a creative act when a new mathematical object or technique comes into being, stirring up the matter-meaning mixture. This speaks to the speculative force of mathematics, but brings the ontology away from the absolute. According to Zalamea, this process of remixing is not well captured in elementary mathematics, but only in more advanced mathematics – and hence his critique of the analytic tradition and philosophies of mathematics that focus only on the meaning of statements like 7+5=12 or on the classical foundational 'crises' of Cantor and Gödel. It's the rich contemporary concepts of topoi and categories that he turns to: "Topoi, which are something like parallel universes for the development of mathematics, are categorical environments sufficiently vast for the development of an entire sophisticated technology of the relative to be possible." (Zalamea, 2009, p. 141).

Zalamea also draws extensively on what he calls the "dynamic Platonism" of the philosopher Albert Lautman, an inspiration for Deleuze as well. Lautman showed how mathematics often develops through breaking up its own rigidity by remixing key pairings like continuous/discrete or symmetry/dissymmetry. New mathematical structures emerge through transits and collaborations that partake in that remixing.

> The richness of mathematics is largely due to that elastic duplicity that permits, both technically and theoretically, its natural transit between the ideal and the real. (Zalamea, 2009, p.54)

> Contrary notions (local/global, form/matter, container/contained, etc) dwell within groups, number fields, Riemann surfaces and many other constructions … the contraries are not opposed to one another, but, rather, are capable of composing with one another so as to constitute those mixtures we call mathematics. (Zalamea, 2009, p. 58)

In discussing the mathematician Alain Conne's "Quiddital mathematics" – as well as mathematicians Michael Atiyah, Peter Lax, and Maxim Kontsevich – Zalamea suggests that some of this work points to a kind of "intensified, infinitely refined Pythagoreanism" (p.226). For Zalamea, this means that such work might support new

insights into physico-mathematical objects, mapping new mixtures of number and matter. He argues that these new mathematical developments show how arithmetic and physics are woven together in ways that are not predetermined in advance; how the ubiquity of noncommutative processes in "actual nature" point to a "conceptual nature" (p.223). Notably, Zalamea is committed to a kind of progress whereby new maths can in fact enhance or improve our ability to mathematize. Zalamea suggests that the specific mathematical practices that have emerged in the last decades are an amplification of human "technical, imaginative and rational capacities" (p.375). In his words "the invasion of cohomologies, groups, and metrics" has been decisive in advancing this kind of metamorphic mathematics, and in enhancing our ability to model the material world (p. 373). In the next section I turn to the ways in which this "fluid" nature of mathematics engages with the digital and the discrete, in the work of Gregory Chaitin and Giuseppe Longo.

Computation and continuity

Mathematics seems to become enlarged, again and again, in Zalamea's interlacing process of transits, across the physical sciences, and across mathematical domains. Gregory Chaitin, widely known for his work in mathematics and computer science, describes himself as a contemporary Pythagorean, and suggests that a post-Gödel "open" and "creative" mathematics is at work in the world (Chaitin, 2012, p. 12-13). For Chaitin mathematics also undergoes a historical evolution, so that current styles emerging out of developments in the twentieth century, force us to realize that computers must be considered, in his terms, "a revolutionary new kind of mathematics." (Chaitin, 2012, p.33).

Notably, Chaitin is often an inspiration to current theorists of the computational universe, everyone from Stephen Wolfram (2002) to Patricia Clough (2016) and Luciana Parisi (2016), for he proclaims that the software universe runs on a math that "cannot provide certainty because it is not closed, mechanical, it is creative, plastic, open!" (Chaitin, 2012, p.29). He contrasts the "old" math of "Newtonian differential equations" with what he calls the "postmodern discrete algorithmic math" of computing, a mathematics that has "infinite complexity" (Chaitin, 2012, p. 34).

Chaitin is a Pythagorean because he is not simply seeking to simulate living systems using mathematical 'systems biology', but rather wants to "find the simplest possible mathematical life-form" (Chaitin, 2012, p. 41). He states "Math itself evolves, math is completely organic" (Chaitin, 2012, p.88). This process of evolution, he asserts, is not simply a gradual continuation of mathematics, but entails radical invention, whereby mathematics becomes radically different: "each time it faces a significant new challenge, mathematics transforms itself" (Chaitin, 2012, p. 87). In other words, it mutates and may become unrecognizable to itself. This actualization of different kinds of mathematics is for Chaitin evidence of a small 'm' mathematics emergent in our environment, however he still subscribes to a capital "M" mathematics that he describes as "static, eternal, and perfect" (Chaitin, 2012, p.75). Based on this claim, and some other clues, one finds lurking in Chaitin's writing, as in many speculative projects, a commitment and desire for a fixed and static absolute. Moreover, contemporary mathematics, in Chaitin's perspective, is more aligned with computational paradigms of computer science, rather than modern algebra, which makes his ideas appealing to those theorizing the relationship between mathematics and information (where matter and information are confounded).

The mathematician Giuseppe Longo (2015) critiques this image of a computational universe, and calls it a "flat" and "uni-dimensional" discrete-computational approach. Such an approach to the question of mathematiz-ability is built on Turing's project to build a logical-formal computing machine, and is therefore tied to a kind of axiomatic, set-theoretic and logical image of mathematics. Longo (2015) claims that these methods have "profoundly impaired the comprehension of biological phenomena" (p.7). He sees a kind of impoverished logic encoded into the software analysis of complex ecosystemic structures, and goes on to bemoan the dominance of an "arithmetical discrete/finite, decidable (and thus programmable) world view" (p. 8). Zalamea (2009) similarly states that "nothing could therefore be further from an understanding of mathematical invention than a philosophical posture that tries to mimic the set-theoretical analytic, and presumes to indulge in 'antiseptic' procedures as the elimination of the inevitable contradictions of doing mathematics or the reduction of the continuous/discrete dialectic." (p. 183-184).

The question as to how our own human habits of mathematizing are linked to mathematics as a worlding process shifts, with Longo, back to the eco-biological. Longo (2015) emphasizes the "utterly human" concept of symmetry (and the breaking of symmetry) in mathematics, art and language, pointing to the "fundamental bilateral symmetry" that characterizes our animal bodies (p.11). To this he adds the claim that mathematics partakes in an "active relation to the world" captured in the ongoing developments of different kinds of measurement: classical, relativistic, and quantum (see also de Freitas, 2016 and de Freitas & Sinclair, 2018, 2020). He suggests that non-commutative geometries might help us better comprehend ontogenetic biological processes, as cascades of symmetry changes. He goes so far as to say that there is a correspondence between mathematics (as a study of quantities organized in structures) and the cosmos, but decries that "this shouldn't be considered a new Pythagoreanism" (p.12). Mathematical ability, for Longo, entails a coordinated action with the world which resists us – the world says "no", and "channels our epistemic praxis, which is of an eminently organizational character ..." (p.13).

This "real friction with the world" enmeshes material processes with mathematics, a kind of geologic entailment that goes back to pre-human forms, whilst refusing any sort of immanent mathematical structure (p.16). Our brain and body are organized in such a way, whereby particular physiological structures and neural networks are both conditions for particular kinds of geometry, and simultaneously plastic, responsive and generative, allowing for new kinds of sensitivity to emerge. Longo (2015), for instance, considers a radically different alien mathematics produced if the usual kind of corporeal symmetry that we enjoy was absent (p. 18). Similarly, Ian Stewart (2017) argues that we consider the existence of a fully alien *xenomathematics* that is not simply equivalent to some version of our mathematics, modulo differences in notation and rule. In other words, xenomathematics would not be translatable into human mathematics. Stewart (2017) makes this claim compelling in two concrete scenarios: The first explores an alternative prime number system that would be essentially incomprehensible to us because it would involve such gigantic "computational cost" in terms of the amount of algorithmic and arithmetic work needed to translate it into our own mathematics. The second examines the fundamental aporia at the heart of any axiomatic system, adequate for arithmetic, focusing on problems that emerge,

due to the axiom of choice and its alternatives. All of this suggests, for Stewart, that earthly mathematics is simply human - all too human - in its limitations.

Like Zalamea, Longo critiques the proposal that set theory is an ultimate foundation of mathematics, as this neglects the spatiality of situated mathematics. If the category of sets were the alleged ultimate universe of intelligibility, the mathematical concept of dimension would vanish into dust. For Longo, dimensionality "in the entire semantic richness of the word" is crucial for understanding worlds and worlding processes. Spatial dimension is implicated in any material process, he suggests, as though it were the condition of possibility. Notably, there is something deeply spatial in the theoretical 'turn' that mathematics has taken since Grothendieck (Zalamea, 2009). In contrast, set theory destroys the concept of dimension through isomorphisms that map R^n to R, and N^n to N. "These isomorphisms are essential to the theories in question: in the first case they allow us to speak of cardinality, in the second they allow the definition of a Universal Machine, of Turing's great ideas, which led to the production of compilers and operative systems of informatics." (p. 23). These isomorphisms are indeed essential for certain kinds of mathematics, for certain kinds of mathematics, and yet this uni-dimensional perspective, collapsing all finite isomorphic powers into its flat episteme, seems to shun the spatio-temporal density of matter.

Longo prefers an ontology that seeks the "natural" topology of "intervals", where the interval is that which forbids the absurd isomorphisms mentioned above. Emphasis on the interval relates to Longo's recent elaboration of the continuity/discrete debate (Longo, 2019), and recalls Deleuze's (1985) pursuit of the interval as that which is occupied by affection and intensity – The interval is also related to the Bergsonian centre of indetermination (p. 60). Longo suggests that the concept of the interval is at the empirical heart of mathematics, and generative of so much speculative mathematical invention (see also de Freitas, 2018). He states: "Now, the minimal structure that one needs to assume in order to correlate mathematics and the world is a topological invariance, that of dimension." (p.23). Thus it is the interval - classic instrument of measure, and dimension – that rescues the intelligibility of mathematics. This, suggests Longo, brings home the point that the discrete codifiable world of computation fails miserably to speak to the physical world of life processes.

In related argument, Zalamea (2012), using the work of Charles Peirce, argues that the best way to understand the mathematics of the interval is to reimagine the mingling of chance and continuity. In this way, chance is not simply mathematized as that which breaks with the continuous and enthrones the probably (the thrown dice), through the work of statistics and the discrete, but also that which stitches together the continuous interval with abductive speculation – drawing from a vast surreal space of hypotheses.

This might be our best way to rethink the force of contingency somewhat differently to that of Meillassoux. Instead of a flat static mathematics of sets, Zalamea (2009, 2012) and Longo (2015, 2019) direct our attention to the *work* of mathematical activity – principally, the speculative act of abduction. Through the speculative act of abduction, we smudge the discontinuity and patch together both the mathematical continuum but also the cosmological continuum of life itself. Abduction is then not only a human faculty, but is an expression of a worldly preoccupation with continuity and chance, or synechism and tychism, which were the terms that Peirce used to describe his metaphysics of continuity and chance. For Peirce, continuity and chance are the two entangled metaphysical attributes of the world.

Conclusion

I've focused here on a mathematical capacity (a mathematiz-ability) that might animate the world in ways that are more-than-human, suggesting that a materialist but speculative ontology helps us understand mathematical behaviour broadly conceived. This is not a totalizable capacity waiting to be revealed, not a transcendent "miracle" explaining the unreasonable effectiveness of mathematics, for that would displace the essential contingency – or absolute contingency –of worlding mathematical processes. The capacity to mathematize does not belong to humans, although it is uniquely expressed in human habits of making models, simulations, measurements and other engagements with metamorphic mixtures. When looking across the contributions of Zalamea and Longo, we note a concerted effort to examine the ontological commitments entailed in contemporary mathematical practices, where they find robust creative gestures that bring forth new concepts and new transits. At this scale of practice, Longo draws our attention to the persistent power

of the interval, and the generative tension between the discrete and the continuous, so that we might see more clearly how mathematics is always engaged with nontotalizing methods, in many of its more mundane gestures, and not only when mastering transfinite numbers in Cantorian set theory. Although unable here to do justice to the complexity of each of these perspectives, I hope to have sketched some possible paths forward for new materialist ontologies, as they think with mathematics.

This paper merely pokes at some of the more fascinating philosophical questions pertaining to mathematics, in the hope of engendering more deliberation about mathematical material practices, and with the aim of inviting more writing about the enigmatic relationship between mathematics and matter. To the extent that many people continue to believe, with some just cause, and following Wigner, that mathematics has some sort of uncanny effectiveness in *describing* our material world and predicting its future paths, we are left to ponder whether mathematical gestures are capable of actualizing a proto-mathematical realm of indeterminate potentiality or virtuality immanent to the empirical. Today there are proposals for a "post-empirical" physics which can determine its truth simply by attending to the internal coherence and aesthetic conditions of its mathematical models (see Kragh, 2015 for discussion). In *Lost in Math: How beauty leads physics astray* (2017), Sabine Hossenfelder reveals the extent to which contemporary physics has become obsessed with mathematical symmetries. These current debates regarding the enigmatic relationship between mathematics and matter underscore the ongoing relevance of Wigner's topic. There is no denying that humans are utterly invested in mathematizing that which they encounter, as a material-cultural habit with all kinds of risky consequences, but there is also a speculative force to mathematics that engages in radical worlding experiments. For this reason, we need more transdisciplinary studies on this topic, drawing from anthropology, philosophy, history and biology, exploring the nature of mathematical practices, be they expert, novice, maverick, or non-human.

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Agential realism meets feminist art. A diffractive dialogue between writers, theories and art

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Abstract

This article invites readers to follow our diffractive dialogue, which reflects on our interdisciplinary collaboration in thinking and writing with Karen Barad. Working with Barad's diffractive methodology, we bring her agential realism, insights from quantum physics and feminist theories to contemporary feminist art. The aesthetic practices of three art works are discussed, and we argue that these call for an understanding of eco-, capitalist-, colonialist- and feminist critique as interrelated phenomena in the sense of agential realism. This is because it is not only the art works themselves that create encounter-moments of being-entangled with the bodies and discourses that surround them. From a methodological perspective, we are also interested in marking diffractive moments of encounter with the art works and between us, given our different disciplinary backgrounds. So, we intend to open up a space of encounters between Barad's work, the work of the three artists and the work of ourselves as writers.

Keywords

Karen Barad; feminist art; diffraction; diffractive dialogue; agential realism.

Our article draws on a framework of collective diffractive reading and writing, based on an ongoing and ongoing collaborative process between us. As two PhD students and friends, we are both interested in feminist materialisms and are both torn between working on our projects and care work in times of Corona pandemic. Collective diffractive reading and writing is our framework for this article, based on many telephone calls, videoconferences, and many versions of our text. We want to focus on the entanglements of our own (inter)disciplinary backgrounds. Situated within media culture studies, and working on feminist media art (Alisa), and situated within gender studies and working on a project which connects epigenetics and Karen Barad's works (Lisa), we bring in different perspectives. In discussing the connecting points of feminist art and theories of feminist new materialisms based on Barad's 'agential realism' (Barad, 2007), we will mark where our backgrounds and views come into touch. Because '[t]heorizing, a form of experimenting, is about being in touch. What keeps theories alive and lively is being responsible and responsive to the world's patternings and murmurings.' (Barad, 2015a, p. 154).

This quote from Barad points to the core of a 'diffractive reading'. Coming from quantum physics and working with feminist theories and science studies, Barad uses the physical phenomenon of diffraction to point to the many different influences her work and the world is composed of. Her diffractive methodology is about bringing disciplines and perspectives which seem far apart into conversation. With the help of the epistemological studies of the physicist Niels Bohr, Barad is attempting an ontological reorientation that gives matter a new and participatory status. Based on this reorientation, Barad formulates a performative, post-humanist theory which she calls 'agential realism' in which the arrangement of matter is challenged as a causally given fact or as a mere effect of human activity. This demands a far-reaching rethink of how we can conceive of the relationship between matter and its representation (Barad, 2007). To not assume that human and non-human, matter and discourse or epistemology and ontology are antagonisms but to instead think of differences as being performatively entangled and intertwined is distinctive of agential realism. Here diffraction opens up another way of thinking about differences which is not about dismantling differences but rather about allowing differences 'to blossom' (Thiele 2020) and to be aware of constitutive entanglements that they entail.

We are guided by Barad's 'agential realism' and in particular her idea of 'diffractive reading' which we will explain later. In an ongoing process of becoming, our ideas, our knowledge, our observations and affects meet respectfully and a resonating space of diffraction is created which is fundamentally open.[1] Our approach is based on a dialogue that consciously marks the ability of the other to respond and thus operates on a constant opening.[2] The idea of a dialogical encounter is applied in relation to theory and practice, as well as to the art works themselves. We want to be aware of our involvement in an 'opening' and a continuous construction of the world. Being involved implies our respons_ability of what comes (not) to matter. If diffraction implies openness, the question arises, how do we manage to be open? Our approach is an acting out of entanglements, whereby we consider them to be productive. This is what we understand by diffractive reading.

Diffractive dialogue asserts for us that we name the moments of our encounters at the interfaces of the individual patches. The article will introduce our readers to Barad's main strands of argument (written by Lisa) and illuminate some of the potentialities at stake in these perspectives with regards to contemporary, feminist oriented art (written by Alisa). Committed to diffractive thinking, our approach is similar to sewing a patchwork blanket: moments of encounter between our respective approaches are deliberately not ironed out, but in the sense of diffractive thinking it is the seams on the patches that we consider productive. As some parts emerged, we named them patches.[3] The text grew and as we read it again and again, we suddenly recognised that Barad describes one of her articles as patchwork too: 'This article is a patchwork. Made of disparate parts. Or so it may seem. But why should we understand parts as individually constructed building blocks or disconnected pieces of one another forms of original wholeness?' (Barad, 2015b, p. 406).

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[2] Rachel Handforth and Carol A. Taylor take a similar approach to writing as we do in their essay *Doing academic writing differently: a feminist bricolage* (2016), which is oriented towards a diffractive, new-materialistic thinking. There is a feminist tradition of proposing situated, speculative counter-offers of alternative writing, beyond hegemonic epistemologies and methodologies. See e.g. Donna Haraway (2016), Anna L. Tsing (2015) or Audre Lorde (2007).

[3] The different colours of the patches refer to the physical phenomenon of the diffraction pattern that occurs when light falls on a diffraction grating (e.g. a CD disc). The white light splits into rainbow colours. So, it is not about linearity and chronology, but about a colour spectrum that refers to the relational nature of the differences.

From these considerations the following questions arise from which we are guided: How can we be aware of and open to responses coming from different academic fields? What kind of responses of Barad's agential realism like material-discursive entanglement, in/determinacy and diffraction do we find in the work of contemporary artists? And how does Barad's agential realistic thinking relate to contemporary art practice and theory and vice versa? We have selected the three artists Katherine Behar, Morehshin Allahyari and A.K. Burns because they enable us to experience much of what Barad teaches us in an aesthetic way. Alternating between analyses of art works and theory, a patchwork is created that brings art and theory into dialogue. We should note that one of the artists worked outward from a knowledge of Barad's work (A.K. Burns), whilst another moved into confluence with Baradian thinking (Morehshin Allahyari), and the other used a mixture of both (Katherine Behar). We begin with Behar and show the extent to which her artistic work displays something that we want to call an aesthetic of material-discursive entanglement (Barad, 2007).

Red patch – Katherine Behar and an aesthetic of material-discursive entanglement

Katherine Behar is a media and performance artist, working with video and interactive installation, whose works address feminist issues, materialism and digital culture. In her artistic and theoretical practice, she aims to combine the acknowledgement of constructed knowledge with the acknowledgement of matter. Both are involved in processes of signification and their work is generative. As the editor of the volume Object-Oriented-Feminism (Behar, 2016), Behar brings together contributions whose orientation can be prescribed in the connection of a new materialism, feminism and art practice. According to Behar, this object-oriented feminism is an intervention in dominant philosophical discourses. It aims to 'consider all objects as having bodies already in their thingness' (Behar, 2018, p. 156). Under the sign of a new, object-oriented feminism and the emphasis on the physical thingness of things, these interventions explore the ecological effects of the purposeful objectification of the earth as a human habitat. In addition, they question the networking of human and non-human actors within a fluid data network in a digitally permeated world (Behar, 2016,

p. 4). According to Behar, OOF moves 'its operational agencies from a 'politics of recognition' of a standing out to a politics of immersion, of being with' (ibid. p. 9).

Behar's works follow a logic of the inseparability of being (ontology) and knowledge (epistemology), that is, of the material and the discursive, as introduced theoretically in particular by Barad (2007). The moment of the interweaving of the natural and the cultural are at the core of Behar's artistic explorations. The relationship between nature and culture, which she aims to centre in her artistic practice, does not follow the approach that something apparently pre-exists as 'natural' and is shaped by something 'cultural'. Behar is, however, still concerned with looking at 'the natural' through cultural, discursive lenses. In the artistic practices of Behar, intra-actions (Barad, 2007) of nature and culture can be experienced.

Barad's perspective of material-discursive entanglements of matter, things, people, apparatuses and discourses is impressively reflected in Behar's robot performance Roomba Rumba (2015). In the performance, two vacuum-cleaning robots (model name Roomba) 'dance' around a large, grass-green carpet in the exhibition space, vacuuming (see Fig. 1 and 2). Both are loaded with a potted rubber tree and move with apparently rehearsed choreography to the children's song High Hopes, which was made famous by Frank Sinatra in the late 1940s. It almost seems as if the dancing robots take the initiative and ask the spectators formed around the carpet to move to the beat of the music. Visitors to the performance, on the other hand, see themselves pushed to the edge of the room, which may cause irritation, uncertainty or even amusement. Thus, the vectors of the affective power of the robots or the moving plants remain open.

According to new materialist Jane Bennett's vitalist approach, 'thing power' is thus based on the ability of these robots/rubber trees to affect (Bennett, 2010, p. 6). Agency is divided into human and non-human entities, such as the performance visitors, robots and rubber trees (Bennett, 2010, p. 38). By producing effects and affects on the (non)human bodies, these entities do something and, in this doing, produce themselves. In and through the intra-action of humans, plants and robots in the performance, bodies or material-discursive phenomena are created (Barad, 2008, p. 141). The human body first becomes a dancing body through the technical/plant body

and the technical/plant body becomes a staging actor and instigating dancer through its audience and co-dancers in space. The insight of the human body, the machine and even the plants share an experience which paves the way for an awareness of the vitality (in the sense of Jane Bennett) of non-human beings.

In this socio-technical entanglement of human, plant and technological actors, processes of materialization on the one hand and symbolizations on the other, are thus at work. Behar latently relates this to gender, colonialist and political power relations. Both the invisible black-box work of machines and the housework and cleaning work (in this case vacuuming), which is coded as female in hegemonic discourse, remain invisible to this day. Behar is critical of the increasing humanization of technology and states:

> 'Our sense that the cute, leafy Roombas are anthropomorphic betrays that we humans see ourselves in these machines. [...] This pas de deux aims to upset distinctions between natural and artificial, biological and machinic, behind-the-scenes service work and performative display, and to prompt solidarities across these categories.' (Behar, 2015, n.p.)

The previously mentioned symbolizations or discursive references and cross-references cover a wide spectrum in Roomba Rumba. In the exuberantly marked setting of a dance of Cuban origin, the Rumba may refer to a political tension between communist Cuba and the USA. As tropical plants used to extract rubber, the rubber trees may remind us of capitalist workers' internal exploitation in the global South. The children's song High Hopes, which accompanies the performance acoustically, tells of an ant whose hard work would be rewarded with the fulfilment of the American Dream. The song is about 'high hopes' for a better life and higher social status by boosting the capitalism of US citizens in the 1940s and 1950s; 'high hopes' of fulfilment should always be reserved for the white population. The semiotic and discursive processes unfolding here are inseparably linked to processes of materialization and affection; they condense, interlock and interfere with each other. In order to grasp the material-discursive entanglement of intra-acting phenomena - as Katherine Behar demonstrates in Roomba Rumba - Barad takes up the physical

phenomenon of diffraction, which she introduces as a method to shed light on the indefinite nature of boundaries (Barad, 2008, p. 122).

Figure 1. Katherine Behar, Roomba Rumba (2015). Robotic performance installation with Roombas, potted rubber trees, carpet tiles, sound, variable dimensions. Photograph: Soohyun Kim.

Figure 2. Katherine Behar, Roomba Rumba (2015). Robotic performance installation with Roombas, potted rubber trees, carpet tiles, sound, variable dimensions. Photograph: Soohyun Kim.

Orange patch – Barad's agential realism and diffractive reading

Through Alisa's introduction to Behar it is possible for me to identify a number of connecting factors to Barad's agential realism in the artist's works. Barad and Behar, as with many other feminist theorists and artists, problematise the role of differences and criticise dualistic thinking. To deal with differences Barad uses the diffraction phenomenon to point to the nature of entanglements and 'does not figure difference as either a matter of essence or as inconsequential' (Barad, 2007, p. 72).

Diffraction patterns arise when you drop a stone into water, describing the overlapping waves produced. Diffraction qualifies the behavior of water, sound or light waves when they move into an obstruction and overlap. In contrast to particles, waves can overlap at the same point. But under experimental conditions particles, e.g. electrons can behave like waves, too, as they show a diffraction pattern in the famous double-slit experiment (Barad, 2007, see chapter 3). The setting of the experiment entails a wall with two slits and a screen behind it. On the screen a diffraction pattern appears regardless of whether waves of light or particles like electrons are send through the two slits, the so-called wave-particle duality paradox. This experiment led to controversies about the influence of a measuring instrument on the object of observation. 'So while it is true that diffraction apparatuses measure the effects of difference, even more profoundly they highlight, exhibit, and make evident the entangled structure of the changing and contingent ontology of the world, including the ontology of knowing.' (Barad, 2007, p. 73) With regard to the concept of diffraction, Barad brings together two levels: diffraction as constitutive of the world (ontological level) and diffraction as scientific practice (epistemological level). Each is relevant to her diffractive methodology.

Referring to Haraway, Barad takes up her critical perspective on representationalism. Both trained in natural sciences, they distance from the view of nowhere, meaning the possibility to study an object as a neutral observer from outside and present one's findings in an objective way. According to Haraway (1992) there is no exterior position

and therefore no way to represent or mirror an object of observations. Consequently, there are no independent objects which can represent or reflect their properties. There is no way to mirror the true acceptation of a phenomenon as there is no such thing at all. Instead of reflection which refers to sameness, Haraway focus on diffraction which relates to differences. Both Haraway and Barad not only have scientific practice and knowledge production in mind but also the very essence of world-making.

Barad suggests a diffractive reading by bringing theories from different disciplines into conversation 'to produce an account of natural cultural practices and agencies' (Barad, 2007, p. 232). Important for this account is an equal and respectful reading through one another. Coming from quantum physics, Barad brings together perspectives from natural sciences, feminist science studies, philosophy, queer studies and postcolonial studies. Understanding agency not only as something humans have but also as something non-humans *are*, she develops an agential realism. In contrast to a traditional realistic account of 'discovery' (Barad, 2007, p. 41) there are no pre-existing entities and phenomena become (re)configured through intra-active agential cuts.

Barad introduces the neologism intra-action 'in contrast to the usual 'interaction' which assumes that there are separate individual agencies that precede their interaction, the notion of intra-action recognizes that distinct agencies do not precede, but rather emerge through, their intra-action.' (Barad, 2007, p. 33). As separate agencies do not exist inherently, they become constituted because of agential cuts which never separate for once and all. Human and non-human agencies participate in the making of agential cuts. According to Barad, phenomena are constituted through cuts that are agential and do not exist because of inherent distinctions. She distances from the notion that there are consistent entities which have immanent meaning and boundaries. The reason why we recognize differences is therefore due to the enactment of agential cuts. Cuts, in this sense, separate what is entangled but not forever. Therefore, differences are separate and not separate simultaneously and never identical. So are cuts: 'Different agential cuts produce different phenomena.' (Barad, 2007, p. 175). Agential realism opens up a relational understanding of difference and offers a diffractive methodology to realise this in our thinking and working.

Yellow patch – Morehshin Allahyaris' diffractive approach to re-figure a colonial past

Lisa's remarks on diffraction according to Barad and the meaning of agential cuts have led me to the following questions: how can diffractive thinking be expressed in artistic works and what strategies do artists pursue to do justice to a Baradian form of critique? Basically, we argue that Barad and the artists discussed here share a specific moment: a moment of affirmation. Following Haraway's and Barad's concept of diffraction, Kathrin Thiele describes this moment of affirmation as a kind of complication and as a strategy of increasing complexity.

> 'Critical thinking has to be transformed in a complicating step into the affirmative practice of creating interference, which brings us (in Latour's sense) back to the things in which we are now understood as always already implied and thus can never only understand them 'from outside".'
> (Thiele, 2015, p. 106, transl. AK)

This quotation illustrates to what extent diffraction is to be understood as an affirmative practice and, as such, having a political effect. A new-materialistic, feminist art of the present day thus strives to 'bring us [...] back to things in a new and different way' (Thiele, 2015, p. 106), to bend and scatter our gaze; it wants to open up to new entanglements and to relate ourselves to the things that make a difference in the world - as does the art project described below.

The Iranian artist Morehshin Allahyaris' multi-media installation She Who Sees The Unknown (2016-2018)[4] shows, in an exemplary manner, the extent to which contemporary feminist art refers to the discourses of new materialism and agential realism. But it also aims to demonstrate, how contemporary feminist art addresses, independently of the vocabulary from these contexts, the stubbornness of matter and how, in addition operates in a diffractive way of thinking. She Who Sees The Unknown

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[4] https://mackenzie.art/experience/exhibition/morehshin-allahyari/

brings 3D-printed sculptures, video art and archive materials into dialogue with each other.

In order to be able to think of a feminist and postcolonial present, Allahyari conjures up mythical pasts and speculates on utopian potentials for the re-figuration of mythical, (pre)Islamic beings - dark, monstrous goddesses, such as Huma. In numerous Middle Eastern tales Huma is a three-headed, horned djinni with sharp teeth, snake-like tail and large human-like breasts of the ardent warmth that brings great fever to humans (see Fig. 4). In a video[5] (see Fig. 3), as the centrepiece of the installation, Allahyari tells anew the Huma's demonic story and links Huma to the central catastrophe of our present, global warming. The six-minute video begins with a deep black background that is acoustically interrupted by a quiet, echoing female voice from offstage: 'She who had seen what there was and had embraced the 'otherness'.' In white letters, the spoken word is simultaneously brought to the screen as text. Accompanied by a vibrating, whirring sound, the shadows and contours of the mysterious figure, gendered as 'she', which seems to be the subject of conversation, grow fragmentarily in the centre of the picture; her name is immediately mentioned: 'Her name is Huma. She who is of flame and blaze.' Undefinable contours of her body appear and disappear again in the dark. Admonishingly, Huma's voice exposes Huma's dreaded power and relentless threat to humanity, until finally her whole figure appears in the centre of the picture and the impetus of her rage finds an explanation: 'All to give birth to a parallel world between the ill and the healthy flesh.' The dark, mysterious video corresponds atmospherically with the dark exhibition space. The sculpture of Huma is enthroned on a pedestal - surrounded by glass talismans hanging from the ceiling and set in motion by air movements in the dark exhibition room.

Allahyari understands the artistic practice of re-figuration as an act of going back and restoring a colonial past, which she retells from there. In the encounter between past and present, new connections are created that involve patterns of diffraction; a spectrum of speculative feminist, post-colonial sketches of the future emerge which in the processual act of diffraction results from the overlapping of past and present.

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[5] https://vimeo.com/342057560

The reproduction and re-appropriation of mythical figures, such as Huma, follows the idea of gaining power from black women's bodies, whose monstrosity the artist wants to highlight and bend their stories.

Haraway refers to the optical metaphor of diffraction in order to make the interplay between figural and literary meaning fruitful for the creation of new stories (Haraway, 1992, p. 299). Allahyari's work corresponds with Haraway's understanding of diffraction in that the sculptures invite the viewer to understand differences not as the other of the one, but rather as an effect of relational structures. As a result, old 'colonised' stories can be designed and told in new ways. Allahyari's colonised, mystical beings operate diffractively by providing other (feminist, postcolonial) stories. Thus, their art project not only deals with the historicity of these beings and breaks with a model of linear historiography, but also opens new possibilities for representing Iranian and Persian mythologies.

Haraway recognizes that 'figures collect up hopes and fears and show possibilities and dangers. Both imaginary and material, pure root peoples in stories and link them to histories' (Haraway, 2004, p. 1). But Allahyari's diffractive approach also manifests itself on other levels: She is not interested in talking about monstrous goddess figures of the past, but rather in talking with mythical, supernatural beings. In other words, Allahyari gives the Middle Eastern goddesses a voice on the one hand and a material form on the other hand, thus reversing a subject-object relation and de-centering the (human) subject. This follows on from Barad's criticism of radical constructivism, which conceives of materiality merely as a product of discursive practices and grants objects only a passive status. Allahyari's objects also deny a status as passive surface and inscription surface of meaning attribution; as material 3D sculptures in the exhibition space as well as immaterial 3D animations in the video, they themselves come into play.

Finally, Allahyari's installation demonstrates a third level of diffractive possibilities. Diffraction phenomena are heterogeneous patterns of light and shadow and occur when waves are diverted from their normal movement by obstacles. These phenomena call into question mirror-image relationships between subject and object, original and copy. Allahyari's art project deals decidedly with a questioning of the

Western, ethnological researcher-subject and its colonialist practice in relation to its object of research, the mythical, brown female body of the Far East; but also with a dominant museum view of the auratically staged ethnographic object from a distance in a reflecting glass case. The objects - in this case those female creatures and dark goddesses - are conventionally examined, classified, numbered and thus controlled as the other. The artist bends this practice to the extent that she consciously makes use of this careful conservational practice, but at the same time thwarts the traditional incorporation of the artifacts by the cultural institution museum. It bends this colonialist practice by transferring its excavated and (im)materially processed beings into a phenomenologically conceived connection of body and perception. In material and media practice, the boundaries between meaning-bearing object and meaning-giving subject seem to blur - or, to put it another way, a heterogeneous pattern of light and shadow seems to emerge, undermining certainties.
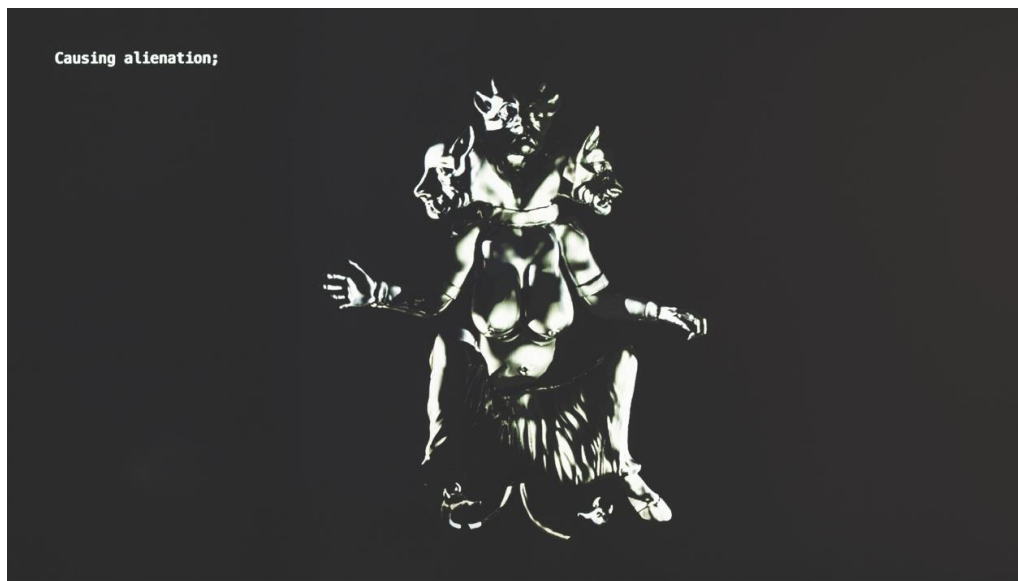

Figure 3. Morehshin Allahyari, She Who Sees The Unknown: Huma (2016) Install shot, HD video projection with audio, image courtesy of artist and MacKenzie Art Gallery..
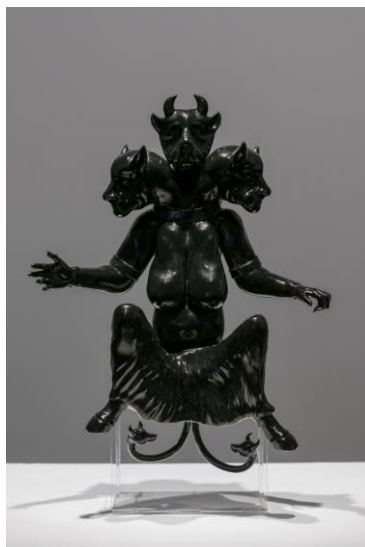
Figure 4. Morehshin Allahyari, She Who Sees The Unknown: Huma (2016) 3D printed black resin sculpture, image courtesy of artist and MacKenzie Art Gallery.

Green patch - Barad's in/determinacy, respons_ability and spacetimematterings

As most of Barad's work focus on examples from natural sciences I first was uncertain about how to bring Barad and feminist art into conversation. In my PhD project I work with scientific studies from epigenetics which seem to be closer to Barad's objects of study. A diffractive methodology is not about staying in one discipline but emphasise the meaning of entanglements. In what follows I will examine more of Barad's concepts pointing to the entangled nature not only of her thinking but of the world.

For Barad science is not only about epistemological challenges. Scientific practices are also influenced by ontological in/determinacy and being attentive to this is an ethical approach, too. What Barad develops is called an ethico-onto-epistemological framework as these three levels overlap in an agential realistic account (Barad, 2007, p. 185). To distance from a human exceptionalism and being attentive to other agencies 'requires a methodology that is attentive to, and responsive/responsible to, the specificity of material entanglements in their agential becoming' (Barad, 2007, p. 91).

According to Barad, knowledge gaps do not exist because of epistemological deficiency, meaning the inability of researchers to understand and explain something exactly or of finding the right tests and experiments, yet. What Barad assumes is an onto-epistemological in/determinacy. There are no pre-existing entities with

determined values which can be fully revealed. That means that phenomena can never be determined for once and all because they are intra-actively constituted. Phenomena are indeterminate and determinate simultaneously. Barad writes:

> 'Just as there are no words with determinate meanings lying in wait […], neither are there things with determinate boundaries and properties whirling aimlessly in the void, bereft of agency, historicity, or meaning, which are only to be bestowed from the outside, as when the agency of Man pronounces the name that attaches to specific beings in the making of word-thing pairs.' (Barad, 2007, p. 150).

According to Barad there are several agencies involved in the move between determinate and indeterminate. A responsible scientific practice to her as to other scholars from feminist science studies means to be attentive to other than human agencies involved in the making of the world. And this is part of Barad's concept of responsibility as Haraway also suggested: taking it literally as 'ability to respond' (Barad, 2015a; Haraway 2008, 2012). The ability to respond is not something only humans have, it is extended to more than humans. But how to trace these abilities and agencies? According to Barad and Haraway this is not possible in traditional disciplines and therefore everyone needs to stay open minded and decentre one's own perspective.

And this is what a diffractive reading is about: being as open as possible to the world's becoming and attentive to the many agencies involved. This is a post-humanist and an inter-disciplinary approach. Following Trinh T. Minh-ha, Haraway makes clear that diffraction phenomena are about a 'critical difference within' (Haraway, 1995, p. 20) - not in the sense of binary difference of being identical with oneself. Minh-ha pursues a diffractive, non-binary conceptualization of difference by choosing a non-separating, non-dialectical model of difference.

Differences, and especially dichotomies, are criticised in many feminist theories leading to hierarchies and discriminations. This is the reason why the difficult question of how to deal with differences is asked and discussed again and again. Barad's recognition of differences does not work with the idea of final, unchangeable, determinate entities. In an agential realistic account differences are the result of cuts

meaning they never exist for once and for all. One can recognise different entities, but they are never totally separated. According to Barad differences are based on entanglements as she writes (see Barad, 2007, p. 36).

Understanding differences as a result of agential cuts and not as inherent separability points to their connections which Barad calls entanglements. Her entangled way of thinking brings together nature and culture, inside and outside, past and present or material and discursive. As Haraway talks about 'naturcultural', Barad's account is material-discursive: 'Discursive practices and material phenomena do not stand in a relationship of externality to each other; rather, *the material and the discursive are mutually implicated in the dynamics of intra-activity*. The relationship between the material and the discursive is one of mutual entailment.' (Barad, 2007, p. 152, emphasis Barad).

In many of her terms Barad uses the hyphen and the slash which points to entanglements of matter and discourse or determinacy and indeterminacy. Several terms she writes in one word as she does with 'spacetimemattering'. Barad follows Haraway's critique on thinking room as container or context and points to the 'dynamic and contingent materialization of space, time, and bodies' (Barad, 2007, p. 224). Neither space nor time or matter are pregiven, unchangeable parameters but are constituted intra-actively as other phenomena. Or to say it the other way around: 'phenomena are entanglements of spacetimemattering' (Barad, 2012a, p. 32). This implies that agential cuts lead to in/determinate materializations in a given space for a given time which do not exist in this way forever. Spacetimemattering is about the intra-active becoming that cannot be completed.

According to agential realism, neither space nor time are understood as an external parameter. Therefore, distinctions such as past, present and future are results of agential cuts too. In a recent article Barad also brings in temporal diffraction showing that something can be in different times simultaneously and not only in different positions as the overlapping waves: 'a given particle can be in a state of coexisting at multiple times – for example, yesterday, today, and tomorrow. […] There is no determinate time, only a specific *temporal indeterminacy*.' (Barad, 2018, p. 218, emphasis Barad).

As already shown for other phenomena, time is not a constant item but is conceptualized as ongoing. As an example, researchers in epigenetics are interested in the influence of environmental factors on gene activity. According to environmental epigenetics, influences like stress, trauma or nutrition can modify gene activity and, in some cases, also the gene activity of the next generation(s). This implies that traumatic events of grandparents can lead to diseases in their grandchildren. And this is not just about heritage, as time becomes confused here. When the trails of one generation can be found in a modified way (e.g. as disease) in the descendants, past, present, and future cannot be understood as totally separated from each other. (see for example Susser & Shang, 1992).

Through getting in touch with Allahyari's work by Alisa's writing, another important aspect of Barad's agential realism came into my mind: the cut between human and non-human. As space, time, and matter, the differentiation of human and non-human is intra-actively enacted too. To be human or not seems to be a fundamental distinction. But according to Barad human and non-human bodies do not differ from each other: 'What constitutes the human (and the nonhuman) is not a fixed or pregiven notion, but neither is it a free-floating ideality. […] The differential constitutes the human (and the nonhuman) is always accompanied by particular exclusions and always open to contestation.' (Barad, 2007, p.153, emphasis Barad). It is an ethical (and political) approach to call into question the relevance of this differentiation and decentre one's own (human) perspective. This is the only way to be open to the becoming of the world and to the many non/human agencies involved in this. Barad's agential realism emphasizes the possibility that diffraction opens up: 'Diffraction unsettles colonialist assumptions of space and time, beginnings and ends, continuity and discontinuity, interior and exterior.' (Barad, 2018, p. 229).

Blue patch – A.K. Burns and the question of the measurability of nothingness

Lisa has made it very clear, Barad insists on an 'ethico-onto-epistemology' and agential processes that cause matter to coagulate as phenomena. Thereby, Barad's discussions do take scientific findings very seriously at the atomic level. In her article

What is the Measure of Nothingness? (2012b) she continues the discussion of the appearance of photons in and out of the void, as is currently understood within the study of quantum physics. In the video installation A Smeary Spot (NS 0), the artist A.K. Burns uses Barad's reflections on nothingness and the void as a starting point for her work.

A Smeary Spot (NS 0) is a video installation of the four-part series Negative Space by the US American artist A.K. Burns. The multi-channel video installations Living Room (NS 00), Leave No Trace (NS 000) and Mirror Collages revolve, both in terms of content and concept, around the core work A Smeary Spot (NS 0). This is constructed as an audio-visual panorama and serves as an introduction to the cycle Negative Space. The title is taken from Joanna Russ' feminist science fiction novel We Who Are About To... from 1977. It describes the aftereffect of looking directly into the sun, a black temporary hole that inevitably follows the field of vision, a punctual void in the form of a black dot.

The scenes in the video take place in two places: in a desert region in the southern US state of Utah and in a black-lined theatre space. Both the desert and the theatre are to be understood as a real and, at the same time, psychological space. According to Burns, they represent the infinite infinity and the unfixed qualities of sheer emptiness.

Burns was substantially influenced to think about the infinity of nothingness and those qualities of emptiness by Barad, who in her essay of the same name asks the question: What is the Measure of Nothingness? (2012b). Starting from this question, Barad sketches a possible experimental set-up - a quantum-physical thought experiment - to measure the emptiness, 'no thing, no thought, no awareness' (p. 4). Once again, as in her monograph Meeting The Universe Halfway (2007), Barad emphasizes the play of intra-action in any measurement that creates worlds - there is no preceding matter and meaning, but rather it is only brought forth performatively in the process of measuring. What is decisive for Barad is that certain 'boundaries and properties of objects within phenomena and determinate contingent meanings are enacted through specific intra-actions" (Barad, 2012b, p. 7). This results in an 'ontological indeterminacy' (p. 7) at the core of matter, which is always only partially resolved in materialization processes. Determinacy is 'materially enacted in the very constitution

of a phenomenon'. It 'always entails constitutive exclusions (that which must remain indeterminate)' (p. 7). In other words: in intra-actions, a phenomenon materializes, whereby something is inevitably excluded. This is ontologically and epistemologically essential. Also, productive ambiguity and the interwoven structure of simultaneous inclusion and exclusion in dynamic materialization processes is what Barad attempts to capture typographically with the character of the slash. Thus, the 'play of in/determinacy accounts for the un/doings of no/thingness.' (p. 8). Barad returns to her initial question of the measurability of emptiness and thus states that emptiness is not nothing and at the same time it is not something. By sketching quantum field theory and explaining the qualities of so-called virtual particles, Barad comes to the conclusion that it is 'key not only to the existence of matter but also to its non-existence, or rather, it is the key to the play of non/existence.' (p. 13).

How can these complex philosophical and quantum theoretical considerations of Barad be applied to A.K. Burns' video installation A Smeary Spot (NS 0)? First, as has already been mentioned, the scenes of desert and theatre represent places of emptiness and infinity. On the other hand, Barad's, introductory words in What is the measure of nothingness? also mark the first minutes of the video work. On one of the projection screens of the three-channel work we first see a musical solo by the saxophonist Matana Roberts. In the dazzling light of the blue and purple spotlights, only the silhouette of the musician with her saxophone on a dark stage becomes visible - the atmospheric visual and acoustic environment in the picture multiplies as the other two projection surfaces illuminate and show billowing wafts of mist spreading out in the room on the stage. On a third projection surface, Mother Flawless (the alter ego of the late drag queen Jack Doroshow) then enters the picture and begins to ponder on nothingness in a monologue taken from Barad: 'How can anything be said about nothing without violating its very nature, perhaps even its conditions of possibility? [...]? Perhaps we should let the emptiness speak for itself." This is immediately followed by the beginning of the aesthetic attempt to let this emptiness speak for itself: Long shots capture a barren desert landscape from different perspectives, acoustically underlaid by muffled sounds. Again and again we encounter so-called 'Acting Agents' from different camera perspectives who, according to Burns, are embodied in the different roles of the performers and act in a discursive as well

as in a real space. Among the 'Acting Agents' are, for example, the so-called 'Free Radicals'. As political activists as well as molecules, the term 'Free Radicals' has an ambiguity: they are looking for electrons and aiming to bring about change. In the video, they collect discarded objects in the desert landscape, which make a provisional (survival) life possible, as well as material resources such as water, air and sunlight. The so-called 'ob-surveyors' also cavort among the 'acting agents', whose aim is to observe the desert region instead of surveying it, as the composite term of observation and surveyor suggests. Repeatedly the same 'acting agents' appear in the desert, as in the second scene of the video, the black-clad theatre space. In the middle of the room, a high pile of rubbish is piled up from which the performers fish their props, only to throw them back there again later. In the theatre space it seems as if Barad's concept of material-discursive entanglement is being tested in an aesthetic practice: the performers make use of the discarded objects (the material world) while reciting a screenplay made up of several texts (the discursive world).

The texts are written by theoreticians and writers such as Karen Barad, Guy Hocquenghem and Ursula K. Le Guin. In each recitation the performer deals with things in a humorous and subtle way, whereby the meaning of what is said is changed or even expanded performatively. In order to connect with Barad, the performers' actions are guided by an interest in the unambiguity of terms and the in/determinacy of things. The performers interact with their props to the extent that they only acquire meaning in the dynamic process. In polyphonic recitations of the texts, a manifesto unfolds in the course of the 53-minute video that, according to Burns, is rooted in an ontological fluidity and difference. Here it becomes clear that Burns is not concerned with overcoming difference (matter-discourse, matter-meaning, subject-object) but rather with viewing difference as an essential aspect of a functioning ecosystem. The artist is thus not concerned with processes of equalization and thus assimilation, since this calls upon marginalised groups of people to adapt to an established and hegemonic system. Rather, the focus is on an affirmative attitude of crossing difference - a 'different difference' according to Thiele.

For Thiele, this urge towards a shift, towards 'another difference', towards a difference 'that no longer focuses on a 'differing from' but shows 'difference differing' or

'difference in itself' (Thiele, 2014, p. 11). What is decisive, therefore, is that a borderline (an agential cut) does not condition a fixed border but a non-binary self-difference. In other words: contrary to the binary appropriation of difference, which presupposes subject and object as two given, independent ontological realms, difference in itself refers to an interwovenness and a co-constitutive relationship between subject and object.

Figure 5. A.K. Burns, A Smeary Spot (Negative Space 0) (2015) Video still from A Smeary Spot, a four-channel video installation. Videos 1-3, HD color, 6-channel sound, 53:13 minute synchronized loop; and video 4, SD b/w, silent, 4:00 minute loop. Courtesy of the artist.

Figure 6. A.K. Burns, A Smeary Spot (Negative Space 0) (2015) Video still from A Smeary Spot, a four-channel video installation. Videos 1-3, HD color, 6-channel sound, 53:13 minute synchronized loop; and video 4, SD b/w, silent, 4:00 minute loop. Courtesy of the artist.

Violet patch – Our patchwork: a diffractive dialogue

We have introduced you to Barad's agential realism and to some other feminist theorists who are assigned to the so-called new materialism(s). In a patchwork-dialogue of selected artworks and Barad's theories, our contribution revolves primarily around the question of whether similar new materialistic tendencies are emerging in contemporary feminist art. But simply asking this question changes the perspective on art, which is why our interpretation of a specific artwork inspired by Barad cannot be separated from its own new materialistic alignment. While Katherine Behar drafts an Object-Oriented-Feminism in her art in reference to a new materialistic thinking, Morehshin Allahyari moves beyond the vocabulary of Barad. In her work She Who Sees the Unknown we were able to identify different levels of diffraction. In the work of the third featured artist, A.K. Burns, the direct reference to Barad and her reflection on the void and the nature of difference became clear.

From these examples from feminist art we are able to show that there are a lot of factors which connect feminist new materialism(s) to in/human agency, onto-epistemological in/determinacy and other diffractions and entanglements. In recent years, numerous artists have dealt directly or indirectly with Barad's thinking. For us bringing together feminist art with perspectives from feminist new materialisms is promising and meaningful. New Materialism(s) provide(s) thinking technologies and vocabularies to think through and to name the aspirations of traversing dualisms in contemporary feminist art.

A leading concept that accompanied us through the work on our article was that of the (diffractive) encounter. On the one hand, it was about bringing contemporary feminist-oriented art and Barad's theory into conversation and on the other hand, we were interested in a diffractive dialogue of our interdisciplinary perspectives as an abbreviated experiment. We are staying with the question in further work: how to read and write diffractively? The background to this idea of encounter is our concern, which Barad taught us to point out to a world beyond binaries through in/determinacy and entanglements. Coming back to Barad's description of a patchwork we would like to close with the following in mind: 'After all, to be a part is not to be absolutely apart but to be constituted and threaded through with the entanglements of part-ing' (Barad, 2015b, p. 406). So, if parts are created by set cuts, this does not necessarily mean that

cuts break things off. In the sense of Barad, this means that there is no absolute difference between assumed entities like here and there or this and that. Rather, these agential cuts emphasise the connection in a new and diffractive way, as we have tried to show in this article.

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What do 'propositions' do for research-creation? Truth and modality in Whitehead and Wittgenstein

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Abstract

Research-creation is a way of researching socio-material processes as art practices. Scholars and artists pursuing research-creation often reference Whitehead's conceptualisation of the 'proposition' as a key theoretical device for speculative and creative work. However, this scholarship perhaps downplays the truth/false distinction that is essential to Whitehead's account of the proposition in favour of the proposition's potential as a speculative tool. In this paper, I explore the proposition as conceptualized by Whitehead. I think with a series of music theory concepts to theorise how Whitehead's proposition explores a modality of truth. I then discuss how the concept is taken up in research-creation. I frictionally bring together Whitehead's articulation of the proposition with that of the early Wittgenstein's. Finally, I discuss some promises and perils of this approach, with direct relevance to questions around research method and methodology in the social sciences. This article is of relevance to scholars interested in research applications of process philosophy, graduate or post-graduate students interested in an introduction to Whitehead, and research-creation practitioners interested in the proposition.

Keywords

research-creation; proposition; Whitehead; modality; representation.

Introduction

Research-creation, as I understand it, is a way of researching socio-material processes as art practices: it is both the doing and theorising of research (Truman & Springgay, 2015), and is animated by a deliberately queer, crip, and anti-colonial perspective (Loveless, 2019; Shannon, 2020; Truman et al., 2019). Research-creation does not adopt any particular theoretical orientation, although many of the scholars who use the term 'research-creation' are drawn to process philosophies (e.g. Manning & Massumi, 2014), theories of affect (e.g. Loveless, 2019; Truman & Shannon, 2018), and feminist materialisms (e.g. Myers, 2017; Shannon & Truman, 2020). This way of thinking about research-creation often takes up Alfred North Whitehead's conceptualisation of the *proposition* as a primary organising concept.[1] This work emphasises Whitehead's description of the proposition as a 'lure' for speculative and creative activity, but sometimes de-emphasises the concept's roots as a speech act that can be judged to be either true or false. Whitehead expanded significantly on this "ordinary logical account of the 'proposition'" and used the term in complex ways in his later 'organic' philosophy, which is the focus of this paper (Whitehead, 1929/1978, p. 25). However, the imprint of the 'ordinary logical account' remains central in his work. In this way, if research-creation is a method of inquiry that employs the term 'proposition' in order to understand something or 'find something out', then there is much to be gained methodologically by digging deeper into Whitehead's attempt to rethink propositions and their determination of truth or falsehood. This is particularly important in the contemporary political moment, in which 'truth' is mobilised as a stand-in for cis-hetero and ableist descriptions of corporeal hierarchies and white nationalist accounts of history, and in which plurality, queerness and attempts at decolonisation are dismissed as watery truth 'relativisms'.

The idea of *modality* is important to how I understand truth in this paper. In linguistics, a 'modal' is an expression that qualifies the truth of a judgement. For example: it *must* be true that…, it *cannot* be true that…, or it *might* be true that. However, my understanding of modality is also inspired by the term's use in music theory. In music theory, modality is a description of how 'light' or 'dark' a scale sounds. Much of

[1] Although plenty of research-creation *doesn't* do this: for instance, the work of Natalie Loveless (2019).

European harmony is animated by two primary modes: the major scale (which sounds 'light') and the minor scales (which sound 'dark'). By way of a contrast, modal harmony reconfigures the major/minor binary into seven degrees of 'majority' or 'minority', through an increasingly darkening series of semi-tonal modulations. While it still retains the major/minor distinction (which technically relates to the number of semi-tones between the first and third notes of the scale), modal harmony complicates the notion of the major(light)-minor(dark) dyad. This is also what modal logics do: while they retain the true/false distinction, they expand upon how that truth is conditioned. I write more about how modality is evaluated in research-creation later.

In this paper, I want to bring more specificity to the use of Whitehead's proposition in research-creation. I do so by unpacking Whitehead's conceptualisation of the proposition from *Process & Reality*, and considering what this does for research-creation, but then also exploring its implications more broadly as part of a wider deliberation about new methods and methodologies in the social-material sciences. This will entail a careful elaboration of how truth and speculation are linked in language and act; I will argue that new materialist research methods must address the problem of *modal* truth if they are to adequately take up and further queer, crip and anti-colonial perspectives. I begin this paper with a detailed description of the proposition as conceptualized by Whitehead. Then, I show how the proposition is used in research-creation. I include a case study on the *Walking Scoring Device* from my own research-creation to illustrate how this works in practice. I then reframe the speculative potential of Whitehead's understanding of the proposition by invoking Ludwig Wittgenstein's (early) articulation of the proposition in *Tractatus Logico Philosophicus:* I do so to argue that innovative research methods must seek a modal means to encounter the complexity of situated truth claims so that 'degrees' of truth, 'divergent' truths, and 'alternative' truths can be dissected and understood as part of a complex propositional landscape. In the next section, I begin my explication of Whitehead's proposition.

Whitehead's proposition

The 'ordinary, logical account' of the proposition is of an idea that (1) is proposed as a written statement and (2) can be judged as either true or false: for example, 'coriander is green'. However, in *Process and Reality*, Alfred North Whitehead (1929/1978: hereafter P&R) suggests that the 'truth' of a proposition is linked to its capacity for speculation. For Whitehead, it is this speculative potential that is most interesting about the proposition. Whether true or false, Whitehead suggests that propositions are "tales that perhaps might be told about particular actualities" (P&R, p. 256). A proposition, then, is "a lure for feeling" (P&R, p. 31), where what is 'felt' is an interaction of *potential* and *actual* that *brings about something new*.

Bringing forth 'something new' is a key function of the proposition. As Stephanie Springgay (2016) writes: "Propositions are proposals about how things may be rather than what is" (p. 61). And this propositional 'something new' has a distinctive relationship with true/false determination. It is this latter aspect of Whitehead's proposition that I want to expand on in this paper: his contention that a restricted analytic account of the proposition as either true or false fails to reckon with the expanded modality of truth that opens up when we begin to think speculatively. In other words, for Whitehead, judging propositions in terms of a true/false binary misses the nuanced way in which truth and speculation are linked, and so "expresses only a restricted aspect of its role in the universe" (P&R, p. 25, emphasis mine): namely, when the feeling lured by that proposition is a true/false judgement. To think beyond this restriction requires an explanation of some concepts from Whitehead's wider 'organic' philosophy, which I turn to in the next section.

Actual entities, potentialities, and relevance in Whitehead's organic philosophy.

For Whitehead, the proposition is a restriction of *potential* to what is *actual*. Whitehead describes actuality as made up of streams of thin slices of space and time. Actual things, such as tables, hats and coriander are actually a series of events, or what he sometimes calls 'actual occasions.' Each actual occasion unfolds along a stream of microscopic, micro-spatial, micro-temporal contours. In this way, according to Brian Massumi (2014), actual occasions take "the word "actual" in its etymological sense:

"in act"" (p. 59, italics in original). Whitehead uses the term concrescence to describe the contour along which each occasion unfolds. When one actual occasion has fully unfolded—or concresced—it is instantly cannibalised into 'data' for new occasions. Whitehead calls this process 'feeling' or 'prehension': fully-concresced events directly feed (or are felt into) the next events, which in turn unfold until they feed the next, and so on.

Feeling is not linear between one event and its sequel. In other words, one event does not feed directly into a second event. Rather, *all* previous occasions are data for *all* new occasions. Or, to put it another way, every concresced occasion in the whole universe has some part to play in feeding—or feeling, or prehending—into the next wave of occasions. The extent to which any individual occasion trickles into the formation of a new occasion depends on how *relevant* it is. And relevance (or what Whitehead calls 'definiteness') is where the proposition comes in. This is because relevance is determined by the proposition. For Whitehead, this means that the proposition restricts potential to a particular arrangement of actual occasions: or, more specifically, to the *relations* between those occasions (or what Whitehead calls the 'logical subject'). In so doing, the proposition 'lures feeling': it shapes how previous occasions are felt into the next occasions by determining their relevance to the current ingression. Whitehead writes:

> The proposition is the potentiality of the eternal object, as a determinant of definiteness, in some determinate mode of restricted reference to the logical subjects. (P&R, p. 257)

Or, to paraphrase:

> The proposition is [the possibility that a particular potential might be applied] as a determinant of [the relevance of previous occasions to the new occasion], in some determinate mode of restricted reference to [the relations within a particular arrangement of occasions]. (P&R, p. 257)

Now, in the ordinary, logical account of the proposition, potential is restricted to a particular configuration of occasions in such a way that *how* they feed into the next wave of occasions is as statements that can be judged true/false. For instance, 'it is raining' is a proposition that may be deemed to be true or false on any given occasion.

But it also lures the *speculative potential* of rain on any such occasion. In this way, propositions stretch into the speculative dimensions of our research (or 'truth determination') methods. Whitehead goes on to write: "Other propositions are felt with feelings whose subjective forms are horror, disgust, or indignation" (P&R, p. 25). In other words, human feeling shapes: (1) how the proposition is interpreted (or ingressed) by humans and (2) what human feelings it then lures.

The human feeling lured by a proposition is perhaps more obvious when that proposition is written as a prescriptive statement—e.g. 'run around in the rain!'—rather than a descriptive statement—e.g. 'it is raining'. For this reason, artists, including research-creation practitioners, often write propositions with imperative verbs (Manning, 2016a; Manning & Massumi, 2014). Consider, for instance, the imperative "LISTEN," which Max Neuhaus famously stamped onto participants' hands before leading them on listening walks across New York City in the 1960s (Drever, 2009); In this form, the proposition solicits actions: it lures feeling through asking participants to be open to a different kind of receptivity. Similarly, music research-creation duo *Oblique Curiosities'* proposition 'Queer the Landscape!' during their long-distance walk along St Cuthbert's Way lured particular feelings that ended up as songs (Truman & Shannon, 2018). In this way, the imperative verbs "LISTEN" and "Queer!" might be thought of as performing propositionally because they thread truth with speculation. Such propositions may not be subjected to a binary true/false judgement, but Whitehead might argue that they are still propositions because they restrict potential (sound or queerness) to a specific relational nexus (the city or the landscape). In this way, ordinary logical true/false accounts of the proposition are limited because they ignore how potential feelings other than true or false might be lured. However, in order to more accurately align with Whitehead's concept of the proposition, we must also discuss how these imperatives determine relevance.

To repeat myself, slightly, the proposition is a "determinant of definiteness" (P&R, p. 257), in that it determines the relevance of the already concresced events to the new events. In this way, the proposition is a 'relevance wand'. In the context of walking through the British countryside, *Oblique Curiosities'* proposition to "Queer the Landscape!" conjured an interruption to the typical flow of relevance: i.e., cis-abled

white dudes in Northern Face coats marching through the undergrowth whistling Elgar's Nimrod. Instead, 'queer the landscape' lured shrieks, polka dot dresses, and several encounters with stinging nettles, even while it was all kept within the range of acceptability by cis-abled whiteness. Similarly, in Neuhaus's listening walk, the proposition to "LISTEN" invited participants to interrupt ocular-centric modes of navigating the city. That is how the proposition is a 'determinant of definiteness': through maintaining or redirecting the flow of relevance. So far in this section, then, I have conceptualised Whitehead's proposition as restricting potential to the relations between a particular group of actual occasions, in such a way that shapes the relevance of prior occasions to future occasions. Whitehead uses the term 'feeling' (or 'prehension') to describe how prior occasions feed future occasions. In the next section, I will unpack the term 'feeling' in more detail: before I do, I want to attend to how the proposition is felt by different kinds of living and non-living entities.

It's important to note here that 'how' the proposition is ingressed—its 'subjective form'—carries a *more-than-human* truth value that reaches beyond the event and encompasses non-human entities. Let me explain further: Whitehead's organic philosophy is an example of what Blackman and Venn (2010) might call a 'common ontology', by which I mean that it does not theorize human social processes as distinct from 'physical' or 'natural' processes. Instead, many of his concepts are more-than-human, in that they apply to humans, non-human animals, non-animal life, and non-living matter. In this way, Whitehead's philosophy is 'complete' (Williams, 2010). This is not to say that each of Whitehead's concepts applies equally to minerals, toddlers, vegetables, crustaceans and globules: again, the proposition operates through an expansive concept of relevance, and not a simplistic relativism where all truths matter equally. Rather, each entity feels and is felt within its own capacity to do so. As Whitehead writes, the proposition can "intensify, attenuate, inhibit, or transmute, without necessarily entering into clear consciousness, or encountering judgment" (P&R, p. 263). In this way, ingression—the process of feeling and how the feeling is determined by the proposition—is as much a material process that crockery and glaciers undergo as it is an intellectual process that we might deliberately inject into a research encounter. The proposition, then, is not only a written statement or human speech act: propositional behaviour can be conceived at every level of matter. A

written statement of a proposition is merely the proposition's objectification by a thinking human: it symbolises the interactions within the nexus of occasions to which that particular proposition restricts potential. As Sydney Hooper (1945) summarises: "the verbal statement of propositions includes words and phrases which symbolise the [feelings] necessary to indicate the logical subjects of the proposition" (pp. 64-65, emphasis in original). Note here that there are "logical subjects" within any propositional event, whether it pertains to human or non-human processes. The logical subject, for Whitehead, is the relevance of a previous event to the new event, *possibly* informed by a potential rather than *actually* being informed by one. The subjective form of the proposition is the extent to which these logical subjects are felt into the next event. Here, Whitehead is attempting to rethink the logical subject as part of his organic philosophy: to wrestle logic away from the tradition that imposes binary true/false judgements on human actants, and towards a new materialism that includes a modal logic capable of comprehending a far more complex 'truthy' landscape.

So far, I've used the word 'feeling' in quite an apolitical and ill-defined way: in the next section, I want to be more specific about how I'm conceptualising 'feeling'.

What is feeling?

Feeling, as I have already used it here, should not be conflated with emotion, although for Whitehead there are links between the two. Moreover, feeling shouldn't be equated with the sensation of touch, although that's certainly part of it too. Like the proposition, Whitehead describes 'feeling' as a more-than-human mode of experience: humans feel, but so too do non-human animals, non-animal life, and non-living matter. In this way, for Whitehead, feeling is not necessarily cognised. Instead, feeling is what Sara Ahmed (2004) might call an 'impression' of the moment of encounter: to feel a body(mind) is to press up against it and to have been felt by a body(mind) is to have had an impression left upon ones' surface. This impression may include cognition, but also includes non-cognised modes of experience. Yet, it is 'cognition' that is arguably more difficult to interpret (as those of us who draw from affect theories have probably

thought about non-cognitive experience quite a bit): Cognition might entail micro-spatial, micro-temporal moments of valuation and evaluation, as Massumi emphasizes, but we must also attend to how 'value' accumulates as each event unfolds. In this way, feeling isn't (just) passive perception, but rather something that impresses upon both *who is feeling* and *who is felt:* the impressions and their e/valuation accumulates until we must engage in risky diplomacy that faces up to contested tensions, frictions and deniers all about. As Sylvia Wynter (2001) suggests, the 'feeling of being human' is sociogenetic, in that it shapes and is shaped on a material level by both biological and sociocultural structures. In this way, feeling is historied and material, and accumulates a complex web of truth valuations that are related through the proposition's sorting of relevance ('determining of definiteness'). And it is precisely for that reason that I am focusing on the ways in which the proposition carries with it a kind of modal logic, thoroughly situated in events and occasions, non-judgmental in terms of a simplistic true/false determination, and yet fully committed to distributing and engaging with a landscape of minor truths competing for relevance. In other words, 'things' feel within their own capacity to do so, and that capacity is distinctive and different from others' capacities to feel. As I aim to show in the following sections, this elaboration of Whitehead's proposition helps us to articulate what exactly is innovative about research-creation and how such methods mobilize modal logics through their use of propositions. Before that, I briefly summarise my thoughts on Whitehead so far.

Summary of the proposition: How do we value truth?

Although Whitehead doesn't outright reject the truth-value of a proposition, he's much more interested in what a proposition *does*. He writes: "in the real world it is more important that a proposition be interesting than that it be true. The importance of truth is, that it adds to interest" (p. 259). Importantly, Whitehead is not *devaluing* truth when he says this, but rather is asking us to reconsider the *way we value* truth. The point is crucial in properly understanding the nature of a proposition. Indeed, "interesting" is code here for 'relevance', and underscores our passionate attachments to truths, and how they 'matter' for that reason. In the next section, I discuss some examples of

research-creation, their use of propositions, and show how this is linked to larger questions of research method in the socio-material sciences. Attention to the nature of the proposition has significant implications for how research is done. It enables researchers to conceptualise how more-than-human actants reconfigure the research occasion in which they are embedded. Finally, Whitehead's concept of the proposition shows us how speculation and truth valuation are working together (i.e., that there is not one and then the other as separate): this allows us to think methodologically in far riskier ways and thereby address the polarized, contested and settler-colonial world in which we are working. The proposition moves with intellectual and artistic rigour, opening onto new imaginaries, and at the same time unfolds through processes of valuation. In the next section, I move on to thinking about how these processes of speculation and valuation unfold through the proposition's mobilisation in research-creation.

Research-creation: Art and thinking propositionally

Propositions are emergent: they cannot be written by or for a researching human subject. Rather, they wait in a 'restricted realm' to be objectified by a more-than-human nexus. Entering a research encounter with a written statement of the proposition taps into some aspect of this entity. Yet, having formulated and articulated a proposition in advance, you might then encounter three others along the way. You also might not encounter anything. In this way, thinking propositionally is responsive and generative, but also risky, and requires a particular ethical responsibility: to make "an ethical commitment to learning to become affected" (McCormack, 2008, p. 9). In responding and generating, the proposition cannot just shape ('lure') what is already true or about to be true, but also leverages failure, provokes the false, and speculates on 'if not this, then what?' In this way, it invokes a method of inquiry that is essentially *transdisciplinary*, straddling the space between disciplines without filling any of them completely (Loveless, 2019), in search of what Jack Halberstam (2011) might call "more undisciplined knowledge, more questions and fewer answers" (p. 10). In this section, I dig deeper into the nature of research-creation and the extent to which it is animated by the Whiteheadian proposition.

The term 'research-creation' emerged as a Canadian research funding category that recognizes how artistic practice might be conducted or recognised as research (Manning & Massumi, 2014). It was designed to recognise how artists working in universities as teachers were also engaged in research (Truman et al., 2019). It has since been taken up and theorised across the humanities and social sciences. Lots of research might be described as engaging with creative methods and quite a lot also uses the term 'research-creation'. As such, it is useful at this juncture to parse how I understand the term research-creation from other kinds of research that use creative methods, such as arts-based research or practice-as-research.

When you do research-creation, you are making art as a way of researching and theorising (Truman & Springgay, 2015). 'Art instantiates theory,' writes Stephanie Springgay: "[some works of art] are not metaphors, nor representations of theoretical concepts; rather, some works of art event concepts" (interviewed in Truman et al., 2019, p. 226). In other words, when you compose a song, you are doing research and theorising that research, all at the same time. Chapman & Sawchuk (2012) illustrate four different intersections between creative practice and research: *research-for-creation*; *research-from-creation*; *creative presentation of research*; and *research-as-creation.* This model helps to explain how research-creation differs from some other approaches to arts-based research:

1. *Research-for-creation* is research done to inform the creation of art, but where the art itself is not research. This is something done by all artists as a way of informing their creative practice. For instance, I researched the varsoviana when composing for a production of *A Streetcar Named Desire*.

2. *Research-from-creation* refers to scholarship that describes or critiques creative practice. This paper is an example of research-from-creation: it is not art, but rather a description or critical engagement. For example, Truman and Shannon (2018) describe their article about their music duo *Oblique Curiosities* as "Academic Liner Notes" (p. 58), in that it contextualises and describes aspects of the music without being the music.

3. Chapman and Sawchuk's third intersection is that of *creative presentation of research.* This refers to a process by which researchers might creatively represent their research findings. *Creative presentation of research* happens

after the research has already been completed. For example, the researcher might sing their interview transcripts, decoupage them, or do an interpretive dance.

4. Finally, Chapman and Sawchuk outline *creation-as-research*, which is the simultaneous doing of research and creation. In creation-as-research, "creation is required in order for research to emerge" (Chapman & Sawchuk, 2012, p. 19).

Creation-as-research illustrates my orientation to research-creation. The research and its theorisation could not exist without the act of creation because the research is done through the creative endeavour: through the epistemic unfolding of artistic practice. In this way, research-creation is what Erin Manning (2016b) describes as *"a practice that thinks"* (p. 27, italics in original): the practice of composing is what events "concepts-in-the-making" (Manning & Massumi, 2014, p. 89). At the same time, research-creation as I understand it remains distinct from how I conduct my own artistic practice as a music composer because it incorporates other non-musical methods that formalise its findings for academic contexts: art may instantiate theory, but it is not then usually necessary to accompany the writing of a composition for string trio with field notes or an ethics application, or to then publish on it in an academic journal. In this way, research-creation is itself a kind of proposition, that limits creativity to the confines of what can be done with(in) the academy.

In the next section, I go on to introduce an example of a proposition: the *Walking Scoring Device*. In this example, the proposition is a trigger and provocation that shapes the research-encounter (Manning & Massumi, 2014). Unlike the pre-determined, prescriptive methods or schedules sometimes adopted in social inquiry, research-creation is activated by propositions, which "are not intended as a set of directions, or rules that contain and control movement, but as prompts for further experimentation and thought" (Springgay & Truman, 2018, p. 14). Research-creation practitioners have proposed different configurations of the proposition primarily in this fashion (that is, as activators for experimentation). I think about the Walking Scoring Device in such a way. My aim here is to examine this example for how it also

mobilizes some of the other qualities and functions of the proposition as articulated by Whitehead.

An example of a proposition in research-creation: *Walking Scoring Devices.*

I sometimes conduct sound walks with *Walking Scoring Devices*. I have done this with young children in schools, with undergraduate students, and with academics at conferences. The *Walking Scoring Devices* shown in Figure 1 were created for a soundwalk at Manchester Metropolitan University as part of the Summer Institute in Qualitative Research (SIQR) in July 2017. The *Walking Scoring Devices* consist of a short length of firm cardboard, approximately 40cm long and 17cm wide, a bulldog clip, a looped length of string, and a toilet roll. The toilet roll is attached to the Walking Scoring Device with the string so that the toilet roll can be unravelled across the board: this allows the user to rest on the board while scoring with their dominant hand. Depending on the opening proposition, the walker might draw graphic representations of sounds, or/and write down words or phrases they heard. The scoring episode is usually followed by a performance. Depending on the temperament of the participants, this might consist of vocal or instrumental exploration of the score, or just a nice chat. I've often used toilet roll and felt-tip pens as a graphic scoring technique with young children: this is because, unlike rectangular pieces of paper,

toilet rolls don't have borders on their X-axis and so can be endlessly unravelled to allow a continual line or score to be drawn.

Figure 1. The picture shows a pile of five Walking Scoring Devices, already described above. A rectangular label stuck to each includes the words vibration, difference, power, propagation and non-cochlear. [2]

The *Walking Scoring Device* might be thought of as working propositionally: it creates a space for the possibility of restricting certain potentials (sounds) to a particular encounter (the walk with the device). In this way, the proposition is an *enabling constraint* (Manning & Massumi, 2014). Enabling constraints propagate the research-creation process in particular directions by closing down other avenues. Massumi (2015) describes enabling constraints as:

> designed constraints that are meant to create specific conditions for creative interaction where something is set to happen, but there is no pre-conceived

> notion of exactly what the outcome will be or should be. (p. 73)

In this way, the term 'enabling constraint' makes explicit how the proposition restricts potential to a specific nexus in order to propagate creativity. As Manning (2009) writes, "Without the rules of walking, we could invent infinitely, but the infinity would likely be chaotic... the tightness of relational movement's interval would likely be dispersed" (p. 31). The proposition might also be thought of as similar to an *activation device*. Springgay and Truman (2018) write that an activation device "forces something new to occur... insert[ing] itself within the walking-writing practice as a thinking-making-doing" (p. 135). An audio recording device might be an example of an activation device. Taking an audio recording device along with you on a walk pushes thought in a direction that would probably include some audio recording, while taking a Steinway or a chisel and a slab of marble would not. In other words, the potential to be creative in any given encounter depends upon the constraints or conditions placed upon that encounter. In this way, the proposition might be thought of as an activation device or enabling constraint.

The *Walking Scoring Device* introduces enabling-constraints. Toilet paper extends almost infinitely along one axis and so you are less likely to run out of space when composing a graphic score than with A4. Yet, at the same time, it limits what can be drawn on the other axis. *Walking Scoring Devices* are also activation devices. They push the walker to think about sound in a phono-graphic way (Weheliye, 2005). Moreover, the toilet paper can easily be torn, poked through with HB pencils, or turn into a soggy mush in the rain. Meanwhile, juggling toilet roll, bulldog clips, the board, and a pen is often frantic and chaotic. In this way, the devices push thought in a particular direction (e.g. "Why are we pursuing this incredibly difficult form of documentation?" or "This is ridiculous."). I often describe the *Walking Scoring Devices* as propositional: they constrain potential (sounds) to a particular actual nexus (toilet roll+ board+ string+ rain+ mush etc.). In so doing, I indicate both the speculative potential of the proposition, and the ways in which they unfold relevance in the later activation of the scores (vocal or instrumental exploration, or a nice chat).

One thing that I think both activation devices and enabling constraints illustrate is the need for preparation and curation in research-creation: Thinking propositionally should not be conflated with a lack of artistic rigour, or a "Let's turn up and see what happens." In research-creation, the quality of the art *is* the quality of the research and

its theorisation, and so thinking propositionally and with deliberate attention to what might emerge in the encounter should not ever be understood as 'going in unprepared': in this way, it is just like any other improvisatory art practice. For example, aleatoric music incorporates elements of chance, in which throwing a dice can take you down one path or another. But the paths themselves are carefully scored and performing them relies on the skill of the instrumentalists. A further example might be modernist composer Henry Cowell's Mosaic Quartet, which consists of five movements that can be performed in any sequence, but each of the movements is carefully notated. Finally, improvisation is central to jazz music, but the improvisations are rarely a free-for-all and instead follow the harmonic modality implied in the composition's chord sequence and rely on the performers' ability to apply them in interesting ways. Similarly, then, speculation in research-creation is carefully curated: (enablingly) constrained by the proposition's ability to manage a complex terrain of values. In the next and final section of this paper, I turn to Ludwig Wittgenstein's writing on the proposition. Putting his work side-by-side with Whitehead's is generative because it (enablingly) constrains how we understand the proposition.

Representation and the proposition

I began this paper by summarising Whitehead's description of the proposition: I described this as a process by which potential is restricted to the relations within a particular group of events. I also emphasized the role of relevance in Whitehead's work, and the need to take up the question of value and pluralist truth when using this concept. I then explained how the proposition is animated in research-creation, which is mostly as a tool for speculation and which determines relevance through its commitment to queer-feminist praxis. However, it is sometimes difficult to understand how the true/false binary in Whitehead's proposition is applied in research-creation. Making truth 'irrelevant' to research findings is concerning in a world dominated by 'fake news' that mobilises "imperialist nostalgia and white supremacist fantasy" whereby "lies about the past serve the interests of power" (Nyong'o, 2019, p. 44). In other words, there is arguably a need to be more explicit as to how the proposition as mobilised in research-creation attends to this true-false

dichotomy. For this reason, it might be helpful at this point to bring in the 'other big W' of 20th-century analytical philosophy: Ludwig Wittgenstein.

My reading of Wittgenstein here focuses on his early work in the *Tractatus Logico Philosophicus* (2001)*,* which focuses on the 'picturing' relation between what something is called and what something is. This highly *representational* way of thinking about the proposition is quite different to how Whitehead thinks about the proposition: indeed, it's even quite different from how Wittgenstein himself thinks about the proposition in his later writing.[3] From Whitehead's perspective (in *Process and Reality)*, there can be no representation. Representation is what a human does by formulating a description of something that is separate to themselves: this is impossible in Whitehead's more-than-human organic philosophy, in which each entity feels and so co-constitutes its other. Instead, Whitehead describes *prehension:* the material interaction of fully concresced occasions as they are felt into novel occasions. Again, this is not something that only humans do, but is felt at all levels of matter: humans, non-human animals, non-animal life, and non-living matter. In other words, a representation is supposed to be independent of the external reality that it represents, which is impossible in Whitehead's philosophy. However, I bring these two perspectives together—one representational, one non-representational—because of the way each enablingly-constrains the other: if Whitehead's proposition might be critiqued for being too capacious, the early Wittgenstein's might be critiqued for being too anally retentive. And, as Denis Flannery (2019) writes, there is a certain power in anality, "producing awe, not only by virtue of its power to contain, but also by virtue of its power… to take in the world with a view to releasing uncanny powers" (p. 109). In this way, containing or constraining Whitehead's conceptualisation of the proposition through Wittgenstein's might help us to better release its 'uncanny powers'.

In *Tractatus Logico-Philosophicus*, (the early) Wittgenstein (1921/2001, hereafter TLP) defines the proposition as a "picture of reality" (TPL, 4.01).[4] For Wittgenstein, the proposition expresses a 'state of affairs' in such a way that it can be sensed. For instance, one can think of anything in the world: coriander, for example. Your thought

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[3] This by way of a contrast to the complex "overlap and criss-cross" that mark his later 'language games' (Wittgenstein, 2009, p. 62).

[4] Numbers refer to thesis numbers.

'coriander' is what Wittgenstein calls a "logical picture" (TPL, 3). Wittgenstein's proposition, then, is an expression of that picture, with "elements of the propositional sign correspond[ing] to the objects of the thought" (TPL, 3.2). For instance, the proposition 'coriander is green' names the object coriander and the potential green, which in turn relies on two elementary propositions: that (1) there is something in the world that is coriander; and that (2) things in the world can be green. Again, the representational logics underpinning Wittgenstein's proposition are not compatible with Whitehead's articulation of the proposition. For Wittgenstein, the proposition can only be either true or false. He writes, "A proposition must restrict reality to two alternatives: yes or no. In order to do that, it must describe reality completely" (TPL, 4.023). So, the proposition 'coriander is green' is true because coriander *is* green. The proposition would have been false if coriander isn't green, whether because: (1) coriander doesn't exist, (2) things in the world cannot be green, or (3) coriander exists and things can be green, but coriander isn't one of the green things. A proposition, then, as described by the early Wittgenstein, linguistically depicts an arrangement of objects in much the same way that a photograph might visually depict them: Either the photograph accurately depicts an arrangement as it truly is, or it doesn't. There is no in-between.

This conceptualisation of the proposition (found in Wittgenstein's early work and not so much in the later *Philosophical Investigations*) is not commensurate with Whitehead's. Indeed, it's only the following thesis that gives us just a tiny way to link these two extremely different logics:

> A gramophone record, the musical idea, the written notes, and the sound waves, all stand to one another in the same internal relation of depicting that holds between language and the world. They are all constructed according to a common logical plan. (TPL, 4.014)

Here, Wittgenstein invests in a correlation theory of truth, where the truth of the proposition is determined by whether or not it accurately describes (i.e. correlates with) the actual world. Correlation theories of truth are highly representational and very different from the speculative, more-than-representational thought of Whitehead. However, I think there is something to be gained by tapping the *Tractatus* for some

negotiation of 'truth'. Consider how musical notation indicates the arrangement of fingers, motion, keys, hammers, felt and strings that allow me to play Debussy's 'Clare de Lune' from *Suite Bergamasque:* like the written music score, the proposition expresses an arrangement of objects (a 'state of affairs') in such a way that it can be sensed. It's this relationship between written score and sound waves that I want to dwell on for the remainder of this paper: I do so by thinking about the specificity of what my piano does when I play 'Clare de Lune.'

My piano is a Yamaha U3. It's an upright: finished in finger-print magnet glossy black, except for a deep gouge above the pedalboard from one of its previous owners. Grumps (my grandad) gave me the down-payment for the piano on my 18th birthday, and I paid off the rest of it by washing dishes in a nursing home in 48 monthly instalments. The felt on its hammers has hardened over its lifetime and it now has an unusually bright sound: I keep meaning to get it needled. For the time being, assuming I get all the notes right (which in itself is fairly unlikely), 'Clare de Lune' played on my U3 with its gouge and its bright hammers will sound distinctly different to any other similar-aged U3. That's before its complicated by the dishwashing, my popular and jazz rather than classical training, Grumps crying the first time he heard me practising it for my final performance at music school (where, without the score, I flubbed it, gruesomely), and the teeny rhythmic divergences that Romantic impressionist music invites.

Debussy would definitely have disapproved of my wrong notes when playing 'Clare de Lune'. They are definitively wrong: false, as in not described by the score. On the other hand, and while I think Debussy would still probably have hated it, the mawkish rubato I'm prone to (over)indulging in is not 'false': a mawkish but accurate performance is still strictly a true performance. I don't know how he would have felt about my bright-sounding hammers but, again, they are irrelevant to the accuracy of the performance. This is because the written score is already a compromise and a deviation: a way of expressing something that can't be completely notated. It's impossible to notate, for instance, precisely how much to *tenuto* each note from bar 15. Similarly, the ambiguous direction in bar 27 to give *un poco mosso* begs the question: 'a little more what?!' Debussy probably wasn't angling for more wrong notes, but also isn't being particularly specific: More volume? More speed? More 'temperament'? More gouges?!

Similarly, Debussy's 'Minstrels' from *Preludes I* includes the direction that a particular motif should be played *en dehors*—literally, 'in the outside'. In this way, the score allows for variation: it has to, because of the impossibility of writing notation with enough detail to completely express the work. In this way, the space for the variation that must be included as part of a 'true' performance is partially notated into the work.

Lest it is tempting to think this is a feature of impressionist Romantic-era music, even the most stringent examples of earlier classical music include these variations. Before the invention of the earliest pianos around 1700, playing expressively on keyboard instruments was very difficult: dynamics were impossible on a harpsichord. Even if the harpsichord includes two or three manuals, each with a different dynamic range, that's still only three dynamics. For this reason, compositions for keyboard instruments included ornaments. Ornaments, such as trills, turns, acciaccatura and appoggiatura (grace notes), and mordents allowed the performer to improvise and add expression and character to their performance. For instance, Bach's *Goldberg Variations* include turns, which indicate that the performer should play not just the written note but the adjacent two notes as well, in a rhythm of the performer's own choosing. Likewise, the gorgeous fuzzy acoustic distortion on Jacques Loussier's 1959 performance of Bach's *Prelude in C Major* (on Play Bach Vol. 1) also cannot be scored.

My point across all these examples is that any correspondence theory of truth that separates the proposition from the world, and then worries whether it might accurately describe that world, always entails some leakiness. The 'common logical plan' that Wittgenstein suggests unites a score, sound waves and a gramophone recording is 'relevance': the speculative/propositional glue that Whitehead affirms in how the proposition shapes feeling. I know it is clumsy to bring these two together, but I am interested in how this uncomfortable, generatively 'frictional' (Puar, 2012) conjunction might assist us in thinking about research-creation. Consider the correlation between any individual recording and the sound waves it produces: while the recording might go unchanged, there is a leakiness to how that recording might be further transformed by a different record player, the same record player with a different listener, or the same listener on different days. And all of this is to neglect how the recording itself is

subject to all manner of mechanical and computational distortion over time (Weheliye, 2005). In this way, while a recording might register an accurate, true performance of a work, there's no telling what might happen to it next! In other words, neatly parsing true from false is important for determining how a performance is accurate or compelling, but it's precisely that mix of accuracy and compelling that brings us back to the concept of relevance. I think the idea of a variation within 'accuracy' is hugely significant for thinking about research-creation as it allows us to move away from the idea of propositions as working only within binary logics, even whilst affirming the significance of issues of relevance, and so demands we bring to bear a more nuanced modal logic that stretches truth across a spectrum of degree.

Modal logics have evolved over the last century to help us think about the temporal and situated nature of truth determination. As I've already explained, modality in linguistics refers to the way our propositions are always qualified, modulating our epistemic commitment to the truth of the claim, which is then deemed necessarily true, possibly true, or perhaps beyond truth. When added to the proposition, modals don't just propose what is already actually true but allow us to explore situated truths. Crucially, modality is not a matter of 'how true' something is but instead addresses the variation that truth contains within itself: mordents, flat-felted hammers, *un poco mosso,* and fuzzy acoustic distortion.

Closing thoughts: *en dehors* and implications for method

The use of the arts as an approach to conducting and/or disseminating research is proliferating in qualitative educational research. This is particularly true of research that draws from theories of affect, including the feminist new materialisms. The turn to arts-based methods, then, appears to be because of a perception that these methods might be able to better attend to some of the issues I've touched on (parenthetically) in this paper: the crisis of representation, the agency of the more-than-human, and our contested contemporary political ecology. Yet, I think we need to be careful of how we apply such methods. Springgay and Truman (2018) contend that the incommensurability of materialist ontologies and traditional methods doesn't necessarily call for 'new' (or even an end to) methods; Rather, it is the procedural and

extractional orientation towards methods that should be undone. Similarly, Elizabeth St. Pierre (2019) contends that methodological uptake of the ontological turn must inform research *practice* and not just the presentation or theorization of the research *findings*. She writes: "a study cannot be made post qualitative after the fact" (p. 10). This is not to say that representational use of the arts is necessarily 'bad' or uninteresting, but just that it doesn't overcome the logics of representation, and so arguably isn't 'post'-qualitative, and *definitely* isn't an example of research-creation.

Elizabeth de Freitas (2017) pushes the critique further, suggesting five characteristics of research method: her ideas resonate strongly with my discussion of Whitehead's proposition and its potential use in research-creation. De Freitas argues that research methods often embody an obsession with novelty, positioning the researcher as the 'creator of concepts', marking ones' contribution with an easily identifiable keyword (that probably includes some brackets and a hyphen). This is, of course, because of the push to publish (publish or die!) and be cited (be cited or die!) in the university. So, in addition to excluding various kinds of truths (restricted perspectives), research methods must be interrogated for how they desire to mark new ground as an act of building new knowledge empires. De Freitas also shows how methods establish regimes of work and labour, echoing the insights of St. Pierre (2019) and Sarah E. Truman (2021) and their critiques of the procedural platitudes of qualitative and 'post'-qualitative research respectively. Raising these issues brings us back to the hard questions of truth in a pluralist political ecology. But (most importantly for the purposes of this paper) de Freitas elaborates how research methods can be:

> emergent, innovative, and historically transformational… new research methods can emerge out of floods of data and information, and new research methods can… subvert the slow deliberative time of the 'human' subject, by plugging into a more-than-human worldly becoming. (de Freitas, 2017, p. 29)

Research-creation is a practice for understanding something. Employing the proposition as a primary organising concept is what enables research-creation to be emergent, situated, feminist and responsive. However, these mobilisations do not explicitly attend to how these deliberations convene around truth. This raises a problematic proposition of its own: If it doesn't matter if the proposition is true or false,

then the 'understanding' generated through research-creation might be argued to have no link to a truth determination: this is potentially problematic. However, if methods for truth determination are imagined and developed to be more expansive—through rethinking the proposition within a modal logic—then we are getting somewhere. What I'm reaching for, then, is how the proposition—as described by Whitehead as I frictionally rub him up against Wittgenstein—might be employed in research-creation as part of new methodologies emerging in the new transdisciplinary post-humanities.

As I've already touched on, ever so briefly, it's important in the contemporary, contested settler-colonial political ecology to keep a hold of the 'false'. As Tavia Nyong'o (2019) writes: "We undoubtedly live in an era of malignant imperialist nostalgia and white supremacist fantasy. We daily observe how lies about the past serve the interests of power" (p. 44). Populist conservative organisations and politicians have gained a good deal of traction through false propositions that shore up these nostalgic fantasies. For instance, Conservative British minister Priti Patel's statement that she 'would not take the knee to the Black Lives Matter movement,' which relies on the false elementary propositions that 'taking the knee to the Black Lives Matter movement' is something that people do and that Priti Patel might find herself invited to take such a knee. Or the very public debate that removing statues of slave traders from public spaces is an attempt to 'erase history', which again relies on the false elementary propositions that maintaining such statues is an accurate account of history and removing them is capable of erasing that history. Or, finally, the trans-antagonist claim that 'sex is real', which falsely implies that somebody else (presumably trans activists, allies and scholars) is arguing that sex is 'unreal'. These are demonstrably false propositions that get taken up uncritically and in damaging ways. So, as Nyong'o (2019) asks, "what is a queer fabulist to do?" (p. 44).

Just like everything else to do with research-creation, the proposition is not a free-for-all, but an exercise in exacting specificity: a rigorous curation of fabulative, speculative intensities and flows that most definitely keeps hold of 'false': of wrong notes, bad politics and crap art. At the same time, just like the turns and mordents Bach wrote into the Goldberg Variations, the truth-value of a proposition has a modality to it: a capacity for free play between necessity, possibility and impossibility that comes like Debussy's *en dehors* and *un poco mosso:* from the outside, asking us for a little more.

In this way, a modal understanding of truth leaves room for distortion, for bright-sounding flat-felted hammers, and everything else that is true but in excess of the score. The modal landscape of the proposition invites 'fabulation of the false' but doesn't cast out valuation completely: there is truth determination in our relation to the proposition, which operates according to a relevance engine that is modal rather than binary.

Acknowledgements

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Apparatus and Its Uses: 'Ecologising' Diffraction As A Materialist-Epistemological Practice

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Abstract

This paper addresses the problem of how to 'do' theory without implying "that theorizing is outside the world" (Barad & Gandorfer, 2021, p. 16) by elaborating a particular, ecological use of the apparatus. Tracing Foucault's use of the dispositif (Foucault, [1977] 1980, p. 194), I argue that his key invention is identifying the generative capacity of the apparatus in terms of its constraints, which coincide with its situatedness as part of the world. By diffractively reading this invention through Barad's posthumanist use of the apparatus, their agential realist practice of diffraction is re-iterated as a specifically 'ecologising' technique. Rather than following Barad in grounding this technique ontologically, Foucault's "author-function" (Foucault 1969) leads me to ground such theorising an ongoing, materialist-epistemological engagement with the environment.

Keywords

Apparatus; Diffraction; Foucault; Author Function; Ecology.

> I would have preferred to be enveloped in words, borne way beyond all possible beginnings. At the moment of speaking, I would like to have perceived a nameless voice, long preceding me… There would have been no beginnings: instead, speech would proceed from me, while I stood in its path — a slender gap — the point of its possible disappearance.
>
> — Michel Foucault, The Order of Discourse ([1970] 1981, p. 51)

How should we understand the theory we produce; what is its place in our world? It is, perhaps, a question as old as philosophy itself, yet one that seems doubly pertinent in times of growing climate and environmental chaos. With this paper I seek to address the problem of how to 'do' theory without implying "that theorizing is outside the world" (Barad & Gandorfer, 2021, p. 16). As a matter of practice, I seek to define a materialist epistemology capable of functioning beyond the remit of modernity, entangled as it is with the collapsing climatological and ecological systems that defined the Holocene era. To this end, the following elaborates an ecologising technique that is accountable and response-able to conditions of possibility beyond our current Anthropocene boundary event (Haraway 2016, p.100). As an ethics, it is a response to the challenge Michel Serres posed for a posthuman society: "Will we become democrats? I believe that even the language of our ancient reason, which was once supreme, is tottering as it confronts the multiple and scattered voices of the things of the world" (Serres, 2015, p. 57). With the following, I explore the apparatus as both a writing -and a living practice; not in opposition to, or separateness from the world, but as a generative mode of habitation.

The apparatus is of particular interest because of its capacity to address the self-constitutional relation between entities and their environments without recourse to a prior assumed representational gap. Rather than a use that "captures the world" (Barad & Gandorfer, 2021, p. 16), the apparatus might be used to open up a space for the topological organisation (materialisation) of diverse analytics and sense-making practices in nested consistencies. Such a use is, to my mind, critical if we are to develop practices and institutions capable of following—rather than attempting to

determine or exploit—processes of life. The use of the apparatus elaborated here should be approached as a particular application of a constitutional problematics of thought, as raised by Isabelle Stengers in terms of how we "give to the situation the power to make us think," even as we "participate in its own enaction" (2005, p. 187).

In the following, I seek to articulate an ecological use of the apparatus by diffractively reading Foucault with Barad. The technique of diffraction builds on both feminism and quantum physics, where "diffractively engaging with texts and intellectual traditions means that they are dialogically read 'through one another' to engender creative, and unexpected outcomes" (Geraerds & van der Tuin, 2020). This entails building on my reading of their respective epistemological inventions. Reading the analytic technique of Foucault's dispositif through the careful rigour of Barad's quantum procedures allows me to trace a particular, ecological application of knowledge production as a non-representational technique of materialist epistemology. In this, I follow Barad's effort "to understand 'oneself' and the apparatuses that constitute 'oneself' as being *of* the very material-discursive entanglements of which one is intra-acting" (Barad & Gandorfer, 2021, p. 39). Such a relational capacity is elusive, and can be contrasted with the dualistic clarity of Agamben's "modern anthropological machine," which arrests at the outset the play of interiority and exteriority at stake in the use of an apparatus (Agamben, 2004, p. 37). To grasp this interruption of play in modern uses of the apparatus, I will focus on the functioning of a priori's in Foucault's author function to demonstrate an 'ecologising' use of the apparatus that is both accountable and response-able in terms of its environment. This performative reading allows me to conclude that an ecologising use of the apparatus entails a 'rerouting' of theory, displacing-by-circumventing the grounding of text in an interior category of thought, because this necessarily, incessantly re-inscribes the Cartesian separation of theory and world in the very gesture that entails its use. The alternative, ecologising, entails an environmentalising gesture of diffractive self-constitution, where interiority as an a priori condition for knowledge is displaced into a situated, epistemological resolution that both emerges from, and iteratively (re)configures our lifeworlds.

Heterogeneous Ensembles

The story of the apparatus and its uses starts with Michel Foucault's famous articulation of the *dispositif* in a 1977 interview. With the dispositif, he provides a cypher for his work as an authorial machine, developed in his research over the preceding decade. In the following, I will trace the dispositif's constituent elements in his work prior to its 1977 definition, arguing that Foucault's core innovation is to grasp the apparatus in terms of its generative constraints, which coincide with its situatedness as part of the world. With this innovation, Foucault is able to coherently address quizzically broad, yet specific ensembles,

> […] consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral and philanthropic propositions—in short, the said as much as the unsaid. Such are the elements of the apparatus. The apparatus itself is the system of relations that *can be* established between these elements (Foucault, [1977] 1980, p. 194; italics added)

The dispositif offers Foucault the capacity to order relations among wildly diverse materialities. Moreover, the dispositif holds out the possibility of a diversity of ensembles that one *might* establish across diverse taxa. Tracing such discursive formations of power-knowledge qualifies, Foucault suggests, "neither a theory or a method," but rather the possibility "to create a history of the different modes by which, in our culture, human beings are made subjects" (1982, p. 777). In terms of its use, it is the dispositif's procedural capacity to establish diverse relations, more than its specific deployment by Foucault "with reference to a fundamental experience: madness, illness, death, crime, sexuality, and so forth," (1982, p. 779) that comes to matter, as a question of technique.

In articulating this procedural capacity as a dispositif, Foucault responds to a structural, or rather material challenge of the human sciences that he earlier identified in *The Order of Things* in relation to language, which:

> […] cannot represent thought, instantly, in its totality; it is bound to arrange it, part by part, in a linear order…If the mind had the power to express ideas 'as it perceives them', there can be no doubt 'it would express them all at the same time'… It is in this strict sense that language is an analysis of thought: not a

simple patterning, but a profound establishment of order in space (Foucault, [1969] 1994, p. 82).

In a distinction crucial for the work of this paper, Foucault takes the material conditions of language seriously, fundamentally situating speech among the varied elements of the apparatus to be analysed. This "profound establishment" enables the dispositif to incorporate the necessarily sequential logics of language as *one mode of analysis among others*, without submitting the overall analytic capacity of the dispositif to the material logics of language. In this way, rather than maintaining the primacy of language, the dispositif provides theory with a 'proto-topological' possibility space for the "simultaneous comparison of parts" (Foucault, [1969] 1994, p. 83). The invention of the dispositif therefore provides the materialist grounds for an epistemological position that is open by virtue of the distance between thought and language, with which Foucault seeks to "acknowledg[e] the reality of discourse… restoring [it] to its status as an event" ([1969] 1994, p. 82).

According to Giorgio Agamben, the roots of the materialist analytic proposed by Foucault are to be found in the problem of designating "the historical element," raised by one of Foucault's teachers, Jean Hyppolite, in relation to religious practice (Agamben, 2007). Hyppolite discusses this historical element in relation to Hegel's parsing of natural and positive religion, where the natural is "concerned with the immediate and general relation of human reason with the divine," and positive, or historical religion "encompasses the set of beliefs, rules, and rites that in a certain society and at a certain moment are externally imposed on individuals;" entailing, in Hegel's own words, "feelings more or less impressed through constraint upon the soul" (Hegel, as cited in Agamben, 2007, p. 5). With the latter, Hyppolite establishes the "knot of questions implicit in the concept of positivity," thereby outlining the stakes involved in the use of the apparatus: "To investigate the positive elements of a religion, and we might add, of a social state, means to discover in them that which is imposed through a constraint on man, that which obfuscates the purity of reason" (Hyppolite, as cited in Agamben, 2007, p. 6). In construing these historical elements, or "positivities," and their associated "threshold of epistemologisation" (Foucault, [1969] 2002, p. 206) in terms of a dispositif, Foucault moves the locus of analysis away from

pure reason and towards discourse as a material phenomenon. Fundamentally, this generates a heuristic in which language, bound to its material constraints ("part by part, in a linear order" (Foucault, [1969] 1994, p. 82), is distinguished from thought by means of a material analytic procedure. The consequence of this move is that theory becomes materially comparable to other elements of the apparatus. By placing language qua discourse on an equal footing with any other elements of an apparatus, Foucault's dispositif manages to displace statements which prioritise rationality (notably the Hegelian concept of pure reason) as a grounds for analysis. Incorporating these grounds, also known as a priori's, or "god tricks" (Haraway, 1988), among the heterogeneous ensembles of the apparatus, materially grounds Foucault's theoretical work, opening up the possibility for more diverse and responsive ways of thinking the "system[s] of relations that can be established" (Foucault, 1980, p. 194), while simultaneously putting at stake the ordering principles of such ensembles.

Succeeding Hyppolite at the Collège de France, Foucault articulates the principle that allows the historical element to be grasped in his inaugural lecture, *The Order of Discourse* ([1970] 1981). In it, he stresses the interplay of critical (displacing) and genealogical (marking) methods according to the principle of exteriority. With it, Foucault outlines the particular movement that will enable him to mark and displace the essentialism of modern reason, providing the basis for what I seek to elaborate as an 'ecologising' technique, simply by directing analysis away from interior meaning and towards its constitutive environment:

> We must not go from discourse towards its interior, hidden nucleus, towards the heart of a thought or a signification supposed to be manifested in it; but, on the basis of discourse itself, its appearance and its regularity, go towards its external conditions of possibility, towards what gives rise to the aleatory series of these events, and fixes its limits (Foucault, [1970] 1981, p. 67).

Moving from discourse towards its "external conditions of possibility," rather than towards its "hidden nucleus," constitutes the basic *generative principle* of Foucault's epistemology. This deeply materialist logic, in reversing the initial direction of analysis, fundamentally shifts the basis of theory towards its environment. The environment is defined in Foucault both in terms of the conditions of possibility for a dispositif, while

simultaneously "fix[ing] its limits". That which gives rise to a dispositif, to its appearance and regularity in relation to its environment, simultaneously makes specific its capacity to encounter discontinuities and chance, in what is otherwise an "aleatory series" of events. Grasping the simultaneity of possibility and limit demonstrates how the dispositif requires a highly specific technique, by which to reverse the foundational modern gesture of obfuscating materiality among the essentialised necessities of language. With the dispositif, Foucault proposes to, so to speak, 'meet the historical element halfway', describing a movement where the particularities of the environment constitute both the grounds and boundaries of an apparatus in terms of a non-representational, materialist space. Given that human sciences rely on language to convey thought and research, grasping such a constitutively relational movement is a tricky affair:

> The result is that the narrow gap which is to be set to work in the history of ideas, and which consists of dealing not with the representations which might be behind discourse, but with discourses as regular and distinct series of events – this narrow gap looks, I'm afraid, like a small (and perhaps odious) piece of machinery which would enable us to introduce chance, the discontinuous, and materiality at the very roots of thought (Foucault, [1970] 1981, p. 69)

By identifying a "narrow gap" of dealing with discourses as regular and distinct series of events in the face a world "that is not complicit in our knowledge" (Foucault, [1970] 1981, p. 54), Foucault side-steps the dualistic logic that is dominant in the modern history of ideas. The gap is "odious" exactly insofar as it affords its outcomes the same epistemological position as its apparatus, flattening the epistemological conditions of appearance of knowledge. Foucault cannot overstate his materialist intent with this: it serves to introduce *materiality at the very roots of thought*. With this particular materialist manoeuvre, the dispositif opens up in specific, procedural terms the possibility of situated knowledges, proposed by Donna Haraway as "technologies of positioning" that activate "the potent politics and epistemologies of embodied, therefore accountable, objectivity" (Haraway, 1988, p. 588). And so the ecologising

capacity of the dispositif starts to come into focus: a principle of generative constraint grasped as a technique of necessarily partial engagement with an environment.

Yet, the agential locus of a partial engagement with an environment, as implied by use of a dispositif, remains elusive. How should engagements with this 'environment', as a displaced grounds for theory, be understood? An essential definition will not do, as this is exactly what Foucault seeks to avoid with his technique. In The Subject and Power (1982), he elaborates this point in relation to power, asserting that, "[s]ince a theory assumes a prior objectification, it cannot be asserted as a basis for analytical work" (Foucault, 1982, p. 778). The question of power, understood as a constitutively relational feature that structures the conditions of possibility of Foucault's analysis, retains its openness, as a matter of generative principle, at 'the cost' of redirecting the question of its agential status to the text.

In the aptly titled lecture *What is an Author?*, Foucault inquires after the relation of agency and environment in terms of "the author function" ([1969] 1992), p. 299). In posing this "slightly odd question," Foucault seeks to define "the functional conditions of specific discursive practices" ([1969] 1992, p. 299), showing what Isabelle Stengers calls "the relationship of relevance between the situation and the tool" (2005, p. 185). With the author function, Foucault seeks to define "the singular relationship that holds between an author and a text, the manner in which a text apparently points to this figure who is outside and precedes it" ([1969] 1992, p. 300). The invocation of this slightly odd figure, both external and prior to the text, allows us to perceive the dispositif as a response to a question of authorial technique, in line with Foucault's commitment, evidenced in his work from the late 1960s onwards, to employ an epistemological praxis that acknowledges its own conditions of appearance. The human aspect, famously effaced in the sand, therefore nonetheless circumscribes the relations between apparatus and environment, and its specific operations are key to properly understand the situated and partial quality of generative constraint that characterises Foucault's technique.

Responding to the question of authorship, Foucault contrasts his use of the apparatus to the modern deployment of the author function, which, we recall, "go[es] from discourse towards its interior, hidden nucleus" (Foucault, [1970] 1981, p. 67). The

modern function sustains "the privileges of the author through the safeguard of the a priori; the play of representations that formed a particular image of the author is extended within a gray neutrality." (Foucault, [1969] 1992, p. 303). Here, Foucault identifies the a priori as the lynchpin of the modern author function, which is situated representationally in a generic environment of "grey neutrality". The a priori safeguards a privileged position according to a highly particular operation whose "essential basis… [is] primarily concerned with creating an opening where the writing subject endlessly disappears" (Foucault, [1969] 1992, p. 301). The pivotal operation offered by the modern a priori is that the "disappearance of the author… is held in check by the transcendental" (Foucault, [1969] 1992, p. 303). Thus, in its modern operation, the a priori establishes a transcendental anchor for the author to assign meaning while themselves disappearing in a dualistic play that essentialises the rationality of the hidden nucleus by representation in a neutral environment. In order to "go towards its external conditions of possibility" (Foucault, [1970] 1981, p. 67), Foucault seeks to renegotiate the position of the author by explicating their function as part of their environment: "the subject (and its substitutes) must be stripped of its creative role and analysed as a complex and variable function of discourse" (Foucault, [1969] 1992, p. 314).

According to Foucault, to displace the modern a priori and thereby reposition the author as an element of the environment, we need to understand the author function, with reference to Michel Serres, in terms of a "nonaccidental omission" (Foucault, [1969] 1992, p. 311) in the text, which "must be regulated by precise operations that can be situated, analysed, and reduced" (Foucault, [1969] 1992, p. 311). Instead of anchoring it to a transcendental a priori in a space of pure ratio, Foucault positions the author as a function of their environment, and whose deployment of a generative constraint is a decisive, necessarily omitted agential practice: "the barrier imposed by omission was not added from the outside; it arises from the discursive practice in question, which gives it its law" (Foucault, [1969] 1992, p. 311). In a subtle play of dis/placement, Foucault makes the non-accidental omission of the author accountable by the operation of the a priori, opening up the possibility to situate the apparatus in terms of its author function among the material environments it engages. What this shows, is how there is a double omission of the subject at play in Foucault's

use of the apparatus. This omission is both highly particular and foundational to his technique: the subject can only be understood as an element of its environment if the author occupies a formally equal position. With this, Foucault demonstrates the (proto-)diffractive character of his practice, as this omission can only be identified in terms of its situated authorial practice, and therefore iteratively, by returning to the material specificity of a text:

> [t]he phrase, 'return to,' designates a movement with its proper specificity… If we return, it is because of a basic and constructive omission, an omission that is not the result of accident or incomprehension… this return… is not a historical supplement... Rather, it is an effective and necessary means of transforming discursive practice" (Foucault, [1969] 1992, p. 311).

It is in our return, therefore, to Foucault, that it becomes apparent how the question of the subject, in relation to power, is operative simultaneously as a mode of analysis and as an authorial positioning that includes itself in the terms of analysis; these are the coordinates of the small gap by which Foucault's little machine manages to operate beyond the remit of modernity. Removing the necessarily implicit privilege of the author to posit a transcendental a priori as a basis for his analysis, this slightly odd figure, being both external and prior to the text, is accounted for as a non-accidental omission. This omission is secured textually by an a priori that establishes a generative constraint in relation to its environment, thereby allowing the dispositif, and indeed any apparatus, to operate as a bridge between words and things.

With the dispositif, Foucault defines a mode of discursive practice that prefigures diffraction, engaging with "an extremely complex configuration of realities" (Foucault, 1982, p. 786), while simultaneously opening up a self-reflexive timespace that allows for the ethical repurposing, rather than logical superseding, of the rationalist a priori. The epistemological invention I have pursued in Foucault therefore consists in redeploying the omission secured a priori as a generative constraint that both arises from the authorial position and structures their analysis, allowing the inscription of an apparatus among the relations it describes. This deployment of the principle of generative constraint opens up the ethical quality of a text as a technology of positioning, which Felix Guattari later describes as "that existential taking on of

context [that] is always brought about by a praxis which is established in the rupture of the systemic 'pretext'" (Guattari, 2000, p. 36). To the possibility of theory relating to the world, it therefore seems to me that, following the use of the apparatus pioneered by Foucault, 'the world', qua environment, must always remain at stake.

Measurement and Marks

Thirty years after the interview that first relayed Foucault's dispositif, Karen Barad's agential realist use of the apparatus extends its procedural scope into the quantum realm. Their apparatus extends the epistemological threshold of what, in Foucault's work, is still deployed essentially as a literary machine, where "discursive practices are the material conditions that define what counts as meaningful statements" (Barad, 2007, p. 63). While Foucault establishes a generative epistemic reversal by qualifying the regularities of an exterior in the diagrammatic terms of power-relations, Barad's agential-realist reworking of exteriority mobilises quantum measurement to expand the range and quality of agential relations that an apparatus can establish with its environment. In this section I will trace Barad's apparatus as an elaboration of Foucault's particular epistemological technique, or use, showing how it marks itself with/in an environment through the relational quality of measurement procedures.

Foucault's definition of discursive practices, Barad asserts, is "limited to the domain of human social practices" (Barad, 2007, p. 145). Where Foucault established the dispositif in terms of material-discursive relations that "connect the history of systems of thought to the practice of historians" (Foucault, [1970] 1981, p. 58), Barad defines the environment of the apparatus in terms of physical measurement. The conditions of possibility this generates follow a specific, procedural understanding of objectivity: "for one system to have properly measured some property of another system requires a correlation of the properties of the two systems" (Barad, 2007, p. 337). Moreover, in agential realism, correlation is understood intra-actively, meaning correlations constitute entanglements of systems. Therefore, Barad's use of the apparatus engages with Hyppolite's erstwhile "historical element" (Agamben, 2007, p. 3) as situated, entangled phenomena, or "spacetimematterings" (Barad, 2017, p. 179).

By introducing measurement as a privileged technique of relating with conditions of possibility, Barad continues Foucault's move away from a modern mode of accounting that emphasised the interiority and reflexivity of thought. Barad includes both knowledge practices of the human sciences with their "low epistemological profile," as well as the (quantum) physical sciences, which Foucault judged "excessively complicated" to apply his invention to, as, he wrote, "this [would] set the threshold of possible explanations impossibly high" (1980, p. 109). Barad moves beyond the humanistic limitations that Foucault readily admitted constrain his deployment of the dispositif, pointing to a continuity of use between him and Barad that is consistent with the latter's definition of objectivity derived from Niels Bohr (Barad, 2007, p. 120). Therefore, rather than "exclu[ding] nonhuman bodies" whose existence Foucault presumably "takes for granted" (Barad, 2007, p. 169), we can understand Barad's use of the apparatus as an extension of the dispositif. By elaborating its use from within the domain of quantum physics, Barad's careful treatment of measurement practices extends the material scope of the apparatus:

> Apparatuses are the material conditions of possibility and impossibility of mattering; they enact what matters and what is excluded from mattering… The apparatus specifies an agential cut that enacts a resolution (within the phenomenon) of the semantic, as well as ontic, indeterminacy. Hence apparatuses are boundary-making practices (Barad, 2007, p. 148).

The consequences of the extension by the agential realist use of the apparatus can hardly be overstated. Beyond a 'simple' accounting for how discursive statements come to matter, this extension means that any discursive formation enacts its material conditions. This enaction by agential cuts means agency is, in practice, *embodied in its apparatus*: the material specificity of any "boundary-making practice" means that it "enacts a *local* resolution *within* the phenomenon of the inherent ontological indeterminacy" (Barad, 2008, p. 133). This "resolution" enacted in the apparatus is both irreversible and situated, because the specifically ontological indeterminacy prior to such a resolution prevents any one ordering of causal relations to structurally take precedence over any other. In a stunning reversal of modern logic, correlatives of measurement between two systems, or "causal relations," no longer "preexist but rather are intra-actively produced. What is a 'cause' and what is an 'effect'

are intra-actively demarcated through the specific production of marks on bodies" (Barad, 2007, p. 236). With the intra-active measurement-qua-marking of bodies, agential realism broadens the range of the dispositif, binding the apparatus to the particularities of the material-discursive environment of its enactment. This procedure aligns closely with Donna Haraway's notion of objectivity as "situated knowledge", where it "is precisely in the politics and epistemology of partial perspectives that the possibility of sustained, rational, objective inquiry rests" (Haraway, 1988, p. 584).

Counter to representationalist notions of objectivity, the agential realist cut does not merely 'enact a resolution' in the classical sense of focussing on a pre-existent object. Rather, it is itself situated, in the strong sense that the apparatus includes the phenomenon it encounters; it "enacts a causal structure that *entails* the 'causal agent,'" i.e. the "measured object" (Barad, 2007, p. 337). This reversal implies that the concepts we posit as causes of measurements are brought, in a very material sense, into focus ("entailed") by the very apparatuses we deploy. Here, moving towards its environment in reverse, the agential realist apparatus is defined according to a principle of generative constraint. One that, moreover, puts its authorial position qua agential practice at stake: "[e]ntangled practices are productive, and who and what are excluded through these entangled practices matter: different intra-actions produce different phenomena" (Barad, 2007, p. 58). Here, the material specificity of entanglements are both the productive and constraining factor. This leads Barad to return to Bohr and reiterate his complementarity principle in terms that recall how a non-accidental omission relates to its author function: "the subject cannot fully characterise itself without splitting… Only part of the world can be made intelligible to itself at a time, because the other part of the world has to be the part that it makes a difference to" (Barad, 2007, p. 432/42). With this, the apparatus is specified in terms that correlate to the epistemological threshold of quantum physics, whereby discursive practices can be incorporated as materially constitutive agencies:

> [d]iscursive practices are causal intra-actions—they enact causal structures through which one "component" (the "effect") of the phenomenon is marked by another "component" (the "cause") in their differential articulation" (Barad, 2007, p. 335).

More precisely, by enabling the dispositif to mark its quantum physical environment, its "high epistemological profile" is included in a use of the apparatus that is consistent with Foucault's dispositif. In relation to quantum physics, the performative agency of both discursive and material practices are no longer described as a given exteriority, but instead come to *entail* the causal agents they posit. In my words, this means analysis brings contingent conditions of possibility into *situated resolutions*, understood as an agential realist principle of generative constraint. Situated resolutions describe conditions that are intra-actively part of the apparatus-phenomenon qua measurement, as "the intra-active marking of one part of the phenomenon by another" (Barad, 2007, p. 338). The materiality of situated resolutions, incorporating an environment in terms of its material specification in the apparatus, opens in a flash the potential range and heterogeneity of ensembles that might be marked across highly diverse taxa, extending "the productive role of apparatuses in linking issues of natural philosophy, political economy, and human and nonhuman forms of agency" (Barad, 2007, p. 231).

Given this posthuman understanding of discursive practices, the question remains how Barad relates to their Foucauldian heritage. Responding to it entails a return to Barad's contention with Foucault, insofar as it revolves around their respective engagements with exteriority as a generative limitation. Barad asserts that Foucault "honor[s] the nature-culture binary," (Barad, 2007, p. 146) arguing that he "does not tell us in what way the biological and the historical are 'bound together' such that one is not consecutive to the other" (Barad, 2008, p. 127). Barad is right to point out how Foucault's *analytic practice* does not escape its humanist orbit qua environment. As he himself acknowledges, it is precisely this constraint that enables a situated resolution of the human sciences, as it circumscribes the field that is the generative constraint at the basis of his analysis of subject-power relations. I would therefore argue that his authorial practice, or use of the apparatus, establishes the conditions by which relations between the historical and the biological can be, and indeed are, articulated without causal ordering; these conditions are the core epistemological capacity of the apparatus. To analyse the subject as an effect of a dispositif, the agency of any subject—and therefore of the author—must be included in the environment they analyse, necessitating the author's non-accidental omission in the

text. The generative constraint deployed in Foucault's work (on the relation between a humanistic subject and their environment in terms of power-knowledge), should be read as a particular application of his authorial technique, a technique that indeed opens up the possibility for Barad's more "thoroughgoing genealogy" (Barad, 2007, p. 146) of the nature-culture binary. Radicalising the "historical element" of Foucault's teacher Hyppolite, Barad is therefore able to show how "[m]atter is always already an ongoing historicity" (Barad, 2008, p. 139). In doing so, they highlight a continuity with Foucault in their use of the apparatus, centred on the fact that "intra-actions are constraining but not determining" (Barad, 2008, p. 143).

In diffracting the Foucauldian inheritance in Barad, the apparatus, as a specific relation of thought and its outside, is shown to function according to a principle of generative constraint, "going towards its external conditions of possibility" as it "fixes its limits" (Foucault [1970] 1981, 67) in one move. In the Baradian apparatus, this movement entails agential cuts that are accounted for through measurement procedures as the marking of environments. This iterative process, constituting both its conditions of possibility and its material-discursive limits, is the basis of the ecologising of agential realism. With its intra-active mode of correlation, the apparatus is constitutively placed among the 'things of the world', allowing, in principle, a non-representational accounting of theory-in-action. Thus, seen in continuity with Foucault, the significance of Barad's invention is to specify the apparatus as a heuristic for posthuman knowledge production, whose uses are account-able and response-able as physical machines that form complex material topologies.

It follows that, as a technique, using such an apparatus 'puts the position of the author at stake' in terms of a non-representational practice: the tracing (measure/marking) of phenomena is not merely descriptive, occurring in a space of grey neutrality, but situated agentially—thus opening the door to a non-symbolic response-ability of thought. This reiterates the need to locate Barad in the ongoing historicity of their own authorial procedure, the "(iterative re)making" (Barad, 2017, p. 109) by which they themselves "enact a causal structure that entails the causal agent" (Barad, 2007, p. 337).

Instrumental Collapse

The situated resolution of the Baradian apparatus allows for a material accounting of the apparatus as part of its environment, in principle. The question remains how the relationship between environment and author is resolved in Barad's practice, as a thinker whose entanglements seemingly admit no outside. In attempting to situationally resolve the generative constraint of Barad's technique, the goal of this next section is not to critique Barad's work, but rather to pinpoint the author function in agential realism, 'cutting together/apart' their posthuman use with Foucault's invention, to trace the boundaries between theory and the world implied by Barad's 'non-accidental omission'. This will involve turning to the indeterminacy of quantum environments that intra-actively constitute the Baradian apparatus "to be productive of (and part of) phenomena" (Barad, 2007, p. 142). In doing so, I must part ways with Barad's ontological grounding of the indeterminacy at play between macroscalar (classical) and microscalar (quantum) environments, as these grounds are secured by an a priori that, ultimately, con(s)t(r)ains its author function *within* the text.

Barad broadly positions the environment of their apparatus when they stress "the point is to understand that 'humans' are themselves natural phenomena" (Barad, 2007, p. 336). Being *of* nature, rather than in it, is indeed foundational to Barad's posthumanism. "What is at issue," and indicates the stakes involved in Barad's use of the apparatus, "is the nature of reality; not just how the body is positioned or understood in reality but the nature of materiality of the body itself. Matter entails entanglements—that is its nature" (Barad, 2007, p. 132). The Baradian apparatus is positioned in relation to the materiality of quantum environments to grasp how bodies become marked intra-actively. Such quantum environments are qualified as states of "semantic, as well as ontic, indeterminacy" (Barad, 2007, p. 148), where the apparatus "enacts a *local* resolution *within* the phenomenon of the inherent ontological indeterminacy" (Barad, 2008, p. 133). Because entanglement is "a generalisation of a superposition to the case of more than one particle" (Barad, 2007, p. 270), and superpositions are indeterminate in the sense that "[t]he principle of quantum superposition states that any given physical system simultaneously holds all of its possible states at once" (Moran, 2019, p.1051), indeterminacy constitutes a material

boundary condition for the Baradian apparatus. Yet, in terms of ongoing historicity, "what matters is 'contextuality'—the conditions of possibility of definition—rather than the actual measurement itself" (Barad, 2007, p. 306), suggesting that indeterminacy always relates to an apparatus under particular conditions.

Stacy Moran formulates this threshold as a question of emergence, with decoherence as the key dynamic that "intervenes on superposition's indeterminacy and localizes it" (Moran, 2019, p. 1052). With decoherence Moran proposes a material interruption of Barad's ontological resolution of indeterminacy:

> While all physicists agree that entanglement and superposition are "normal" functions of quantum mechanics, the question of how (and whether) localizations emerge from quantum phenomena remains a mystery… What new materialism calls "emergence" remains in question for physics, and decoherence is central to the question of what physicists call the "collapse" or "transition" from the quantum to classical realm (Moran, 2019, p. 1057)

Quantum decoherence brings into focus the point at which indeterminate quantum environment and apparatus meet. This involves "the practically irreversible and practically unavoidable disappearance of certain phase relations from the states of local systems by interaction with their environment," which is a long-overlooked relation of entanglement, according to Moran, that "stirs up and 'makes trouble' for quantum feminism" (2019, p. 1060) because it questions the givenness of entangled phenomena. Specifically, decoherence "intervenes on superposition's indeterminacy and localizes it" (2019, p. 1060). In so far as "the agential cut enacts a resolution within the phenomenon of the inherent ontological (and semantic) indeterminacy" (Barad, 2007, p. 334), decoherence provides a dynamic to grasp the relation of phenomena and indeterminacy that is at the heart of the Baradian apparatus-environment dynamic:

> Superposition is deemed the natural state of things until a system comes into contact with an experimental setting and the surrounding measurement apparatus is said to "cause" the system to "decohere," or become a determinate particle—in a word: matter. In a certain sense, the decoherence of

a quantum system is due to its becoming entangled with the environment. (Moran, 2019, p. 1052)

Decoherence shows the quantum physical environment to be *differentially indeterminate*; measurement procedures mark environments in always-already particular material configurations. Decoherence forces the situating of ongoing relational processes of mattering, making measurement matter iteratively with/in particular scalar and temporal sites of spacetimemattering. For Barad, however, decoherence does not situate (their) resolutions, but rather attests to the generic problem of isolating the essential qualities of quantum behaviour in measurement procedures; this is solely due to "interactions with its 'environment', which continually fluctuates in an erratic fashion in such a way that a superposition is 'randomized' into a mixture 'for all practical purposes' (but not in principle)" (2007, p. 279). Following Bohr's definition of objectivity, where measurement apparatuses must be articulated in macroscalar, classical terms to be communicable, Barad finds "no indication that measurements entail any kind of physical collapse, only cuts" (2007, p. 343). Yet these cuts entail decoherence, creating a circular logic that can only be arrested *in principle*. Thus, the ontological environmental characteristic of indeterminacy is maintained at the cost of ignoring environmental particularities, whereas *in practice*, decoherence entails phenomena are always-already resolved with/in given spacetimematterings. This exclusion of particular environments in principle is all the more pertinent given Barad's posthuman tenet that we are situated as part of the living world, which empirically traverses quantum and macroscopic scales (Jianshu et al., 2020).

Thus we return to the "question of emergence" stirred up by Moran, and find ourselves aligned with Barad to the extent that "[a]pparatuses enact agential cuts that produce determinate boundaries and properties of 'entities' *within* phenomena" (Barad, 2007, p. 148; emphasis added). As we have seen, decoherence means any cut necessarily entails a particular environment, with which it co-constitutes a phenomenon. Agential realism however, posits the existence of phenomena per se, seen from the hypothetical vantage point of an indeterminate environment that is, in principle, not subject to decoherence. Barad illustrates this a priori unity by asserting that "no observer inside the universe can see all of what is in the universe" (Smolin, 2001, quoted in Barad 2007, 351), thereby presuming a givenness of the universe that

astrophysicists find doubtful (Davis & Lineweaver, 2004). With this presumption of a neutral space, expressed in terms of ontology, it seems that Barad's use of Bohr does not yet 'escape the laboratory' (Barad, 2007, p. 140); following the resolution of the measurement problem of quantum physics in terms of generic cuts, Barad defines phenomena as "ontologically primitive relations—relations without pre-existing relata" (Barad, 2007, p. 333), leading to the ultimate claim that "[p]henomena are constitutive of reality" (Barad, 2007, p. 140). With this definition, Barad secures the relationship of the apparatus and its environment outright, as an ontological a priori that is subsequently applied 'in' the (macroscopic) world. By positing phenomena as ontologically prior, the author function is resolved. Yet, it is resolved in such a way as to make phenomena an essential category correlated with an indeterminate quantum environment. In a discursive sense, the Baradian apparatus is unable to disentangle from Bohr's statement that "the word reality is also a word" (Bohr, as cited in Barad, 2007, p.125), because Barad's resolution, qua ontology, is limited to the discursive sphere, missing the double inversion at play in Foucault's authorial technique, where both the author (as a final grounds) and the subject (as a presumed object) must both be omitted from the text to remain at stake, even though they occupy different (complementary!) positions vis a vis the apparatus. By presuming the status of the environment as an ontological given, the Baradian apparatus becomes unable to account for its own emergence, effectively precluding its ongoing situatedness as part 'of' the world. In doing so, Barad contradicts the sufficient, epistemological remit of their own apparatus, which stipulates that cuts can only be made *within* phenomena in terms of agential separability, which presumes concrete environments and accounts for decoherence. In confronting the Baradian apparatus with its own conditions of possibility, therefore, a curious collapse occurs, which seems to involve—schematically—an ontological premise collapsing into an epistemological practice, by the inclusion of a living environment according to the boundary condition of decoherence.

Interrogating forms of knowledge with their own objects of interrogation—which in discursive terms means interrogating their author functions—causes a curious collapse to occur in the modern apparatus. Barad mischievously describes this point of collapse in a passage that I read as an encounter with an otherwise omitted author

function: "[a]pparently, touching oneself, or being touched by oneself—the ambiguity/undecidability/indeterminacy may itself be the key to the trouble—is not simply troubling but a *moral* violation, the very source of all the trouble" (Barad, 2012b, p. 5). Touching oneself—in a flash, this gesture connects the apparatus to itself while simultaneously constituting it as part of a particular, living environment. This simultaneity short-circuits any a priori that is tethered to a transcendental, generic space, by collapsing the structural indeterminacy of the latter. It also troubles the complementarity principle, as, at any given instance, "a 'measuring instrument' cannot characterize (i.e. be used to measure) itself" (Barad, 2007, p. 347). Moreover, according to this principle, an ontological a priori structurally omits its complementary position (that of the author positing it) in an apparatus. Barad qualifies the resulting situation as "pre-ontological… it is difficult to express and use words, especially because sense-making is also dynamic and part of the dynamics" (Barad & Gandorfer, 2021, p. 19). Indeed, without accounting for that which comes before ontology, namely the "figure who is outside [the text] and precedes it" (Foucault, [1969] 1992, p. 300), a potentially infinite question of prior cause is triggered: "[…] what I mean by 'prior,' it is not temporarily prior, but ontologically prior, and prior, and prior…" (Barad & Gandorfer, 2021, p. 19). Omitting the author by securing the text a priori to an ontological relation, the Foucauldian principle of generative constraint as an environmental relation is broken, and with it, a potentially endless question of prior cause comes to haunt theory. Asserting this generative principle therefore causes a collapse of ontology into epistemology, in the sense that an a priori, securing the discursive position of the author in a generic environment, collapses into the ongoing question of their situated resolution as an authorial practice.

Thus, the movement implied by ecologising comes into view: the ongoing, particular question of the environment collapses the presumed a priori positing of an apparatus ahead of its phenomena. The trouble triggered by self-touching is that of emergence, a question that cannot be denied outright, but is redirected via the apparatus towards its non-accidental omission. The choice, as I see it, is whether this mechanism is directed towards ontology, evoking the eternal return of questioning those essential grounds, or towards epistemology, generating particular material engagements that remain continually at stake. Decoherence underscores how the constitutive, or a priori

seizure of the environment by human logos cannot sustain a living, material relation to the world. Once the author, maintaining the text-as-world, becomes apparent, the neutral space supporting this seizure collapses, opening up a material question of ethics that Foucault (1982) describes as "a constant checking" (p. 778).

Diffractive Ethics

By diffractively reading Foucault's invention of the dispositif and Barad's posthumanist apparatus through one another, I try to take seriously the inescapable situatedness that being part of the world implies for theory. Specifically, it is an attempt to elaborate a technique for ecologising theory in the face of modern epistemologies—living testimonies to centuries-old destructive practices—that today pose an existential threat to most macroscopic lifeworlds on the planet (Trisos et al., 2020). Indeed, the unfolding collapse of climate- and ecological systems stresses existential entanglements with our own lives, as Jem Bendell suggests (2018). As discussed above, such living engagements are precluded by securing the author function by ontological a priori, because it opens a representationalist gap between text and world, triggering modernity's tendency to "explicate itself by endlessly applying itself onto itself" (Serres, 2019 [1969], p. 3). This tendency motivated my parting of ways with Barad and their ontological resolution of indeterminacy. Nonetheless, our paths reconvene in the practice of diffraction, a technique that I contend is able to accommodate decoherence as a generative constraint, enabling an ecologising use of the apparatus as an epistemological materialist practice.

To conclude, I will therefore re-turn to diffraction, a technique that has been employed from the outset in this inquiry. Diffractively, an "ecology of practice" (Stengers 2005, p. 185) has been traced among Foucault, Barad and myself in alignment with Haraway (and others), "cutting together-apart" (Barad, 2014, p.176) a use of the apparatus that positions theory as part of the world by securing the author function as an ongoing relation to their environment, necessarily omitted from the text and therefore always at stake. Re-turning to diffraction, this practice can be reiterated as an ecologising capacity—as a use of the apparatus that acknowledges (with Foucault) its conditions of possibility in terms of generative constraint, specified (with Barad) as an intra-

active, material-discursive practice, constituting (with Haraway) situated resolutions with/in a posthuman, epistemological threshold—that enables response-ability both to and in (i.e. of) the world.

As a shorthand for this complex manoeuvre, I have proposed the term ecologising. This particular diffractive use of the apparatus adds decoherence as a generative constraint to Barad's posthuman technique. This has two important consequences. Firstly, it entails a vital principle for theory, because it explicates the author function as a non-accidental omission secured a priori to their living environment and its irreversible processes (Stengers & Prigogine, [1984] 2017). The environment is thereby constituted as a "threshold of epistemologisation" (Foucault, [1969] 2002, p. 206) that always-already given, yet simultaneously always at stake in the text. This principle specifies an immanent and practical ethics, with the author "tracing the entanglements of this strange topology (where each is inside the other)" (Barad & Gandorfer, 2021, p. 22) as a use of the apparatus that is adaptive in a non-representational sense to processes of life. Simultaneously, ecologising entails diffraction as a demodernising technique because this use collapses the neutral environment in which a transcendental a priori was able to secure the modern author function, collapsing the premise of non-accountability and irresponse-ability that is arguably prevalent among modern patriarchal, colonial and capitalist machines.

If the modern author function's "essential basis… [is] primarily concerned with creating an opening where the writing subject endlessly disappears" (Foucault, [1969] 1992, p. 301), then an ecologising mode of diffraction is primarily concerned with maintaining an opening where the writing subject is continually manifested in terms of the simultaneous possibility and limit afforded by their living environment. This position is accountable non-analogously in the situated resolution of an apparatus. Thus, ecologising follows the small opening that Foucault employed: "[s]ince a theory assumes a prior objectification, it cannot be asserted as a basis for analytical work. But this analytical work cannot proceed without an ongoing conceptualization. And this conceptualization implies critical thought—a constant checking" (1982, p. 778). By displacing ontology into epistemology—collapsing the givenness of phenomena into their situated resolutions—relationships of interior-exterior are presumed to remain at stake. However, the intra-active quality of any diffractive relationship, as an

ongoing adaptive capacity, begs the question of its enactment, i.e. its response-ability. Situated resolutions are not static events, but iterative, material-discursive intra-actions of generative constraint. Echoing *What is an Author?*, Barad defines this temporal quality of diffraction as a matter of re-turn:

> Re-turning as a mode of intra-acting with diffraction–diffracting diffraction–is particularly apt since the temporality of re-turning is integral to the phenomenon of diffraction… Diffraction is not a set pattern, but rather an iterative (re)configuring of patterns of differentiating-entangling. (Barad, 2014, p. 168)

Diffraction, understood in terms of its encounter with its own operation, cannot be univocally defined. Hence "a constant checking", the necessity of which is materially underscored by decoherence, which entails any situated resolution diffractively enacted in an apparatus is irreducible to a more general principle of ordering, as such an ordering in turn triggers decoherence, thereby constituting a further situated resolution. As I've argued, with/in conditions of decoherence, diffraction's iterative boundary-making becomes an epistemological materialist practice of collapse; this applies not only to subsequent iterations, but is constitutional to an ecologising use of an apparatus. Questions of emergence cannot be resolved a priori, but rather re-assert themselves materially with every cut, making response-ability an engagement with generative constraint that precedes accountability. Ecologising diffraction collapses prior distinctions between interior and exterior into an intra-constitutional movement that is environmentally response-able wherever we (re-)turn. This 'collapsing together-apart 'of the ethical and the epistemological in the material specificity of an environment goes to the heart of ecologising diffraction, where diffraction environmentalises itself in a material-ethical gesture. Such collapse, and the agency it implies, does not entail a purposive breaking apart, but rather a non-violent, sensitive touch that is response-able to its intra-active consequences. This use radicalises the causal reversal pioneered by Barad, expanding Foucault's ethics beyond self-care (Foucault, [1984] 1990): ecologising collapses agency as a self-referential category into an ongoing, situated resolution that both emerges from, and iteratively (re)configures our lifeworlds. Such a use of the apparatus allows agency to

be understood as an ongoing response-ability to particular environmental engagements, and with it, theory a generative mode of inhabiting the world.

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Towards a Feminist and Affective Pedagogy of Vulnerability

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Abstract

This paper gives a theoretical-affective account of my experience of teaching the course "Vulnerability, Gender, and Justice." Applied to pedagogy, the notion of vulnerability, diffractive methodologies, and rhizomatic thinking can potentially transform traditional ways of reading philosophy, of understanding ourselves, and of understanding how we are situated in practices within molar and molecular lines. This course aimed to activate potential lines of flight that may fly away from normativity.

Keywords

Diffractive reading; vulnerability; rhizome; affects; pedagogy; feminism.

Introduction

> There is something amorous –but also
> something fatal– about all education.
>
> (Deleuze, 1994, p. 23).

This quotation by Gilles Deleuze can be considered as one of my starting points of thinking an affective pedagogy. Deleuze suggests here that learning entails the amorous and fatal dissolving of the body as it re-articulates and re-forms itself with its surroundings. If we want to be able to engage in such an amorous relationship, one has to embrace their relationality, and the possibility of affecting and being affected by others: we are not isolated individuals that have no ties with one another; on the contrary, we are interdependent, relational beings that constantly affect each other. Openness to others is a condition of possibility of this re-articulation and re-formulation of the body, of this amorous and fatal process of learning. I call this openness "vulnerability:" Vulnerability is usually understood as injurability; nonetheless, my understanding of vulnerability draws on Spinozian consideration of individuality that takes into account a constitutive openness and affectability (Deleuze & Guattari, 1987). Vulnerability, in this sense, is the condition of possibility of being affected.

From my understanding of the world as a monist philosopher influenced by Spinoza (1992; 2002) and Deleuze (1988), and following authors such as Gilson (2014) and Ferrarese (2016, 2017), I argue that human constitutive vulnerability has to do with our affectability. An affect is a fluctuation in a body's capacity to act, which is created through relations, interactions, and engagements with other bodies. For Deleuze (1988, p. 49), affect is "an increase or decrease of the power of acting, for the body and the mind alike." All bodies affect each other and engage in, what feminist materialist scholars referred to as constant intra-actions (Barad, 2007; Stark, 2016). An affective pedagogy takes this into account to shape a relational and non-binary perspective on the intertwinement of knowledge and material conditions, teachers and students, physical bodies, and socio-economic relations. In this sense, an "affective pedagogy reminds us that learning is also a politics of materiality and

affectivity, a politics of socio-economic and physical bodies, school spaces and the emotional lives of students and their teachers" (Hickey-Moody & Harrison, 2018: Theoretical Context section, para. 3).

According to Grossberg (1997) affective pedagogy opens possibilities and aims at co-producing open-ended processes that can lead to unimagined and even unimaginable outcomes (Grossberg, 1997, p. 387). The outcomes are not predefined, but the objective is to empower the participants to reconstruct their worldviews. In this sense, it is entangled with diffractive reading (Haraway, 2004; Barad, 2007; van der Tuin, 2011) and rhizomatics (Deleuze & Guattari, 1987). Both diffractive readings and rhizomatic thinking, as it will be explained below, foster an approach to education and relational co-production of knowledge that is related to openness and to the possibilities of being affected by what we read, with whom we read, where we read, which other texts we are reading or have previously read. The aim of these methodologies is, as we will see, to generate lines of flight −momentary transformations, temporary movements that fly away from normativity− that may result in different theoretical and practical approaches to philosophy in academic settings.

Applied to pedagogy, diffractive reading, vulnerability understood as affectability, and rhizomatics offer ways to conceptualize our collective encounters in the classroom as multiplicities, to account for the relational and material aspects of our work, and to consider our practice in processes of learning-teaching as dynamic, complex, contextualized, situated phenomena. An affective pedagogy of vulnerability reconceptualizes learning as a creative and open-ended process whose outcome is unforeseeable. Openness is a constitutive feature of this pedagogy, and experimentation and creativity are key to this openness: they give rise to unforeseen and productive teaching-learning processes.

An affective pedagogy requires experimenting, letting go of the fantasy of mastery in which the professor in charge of facilitating the learning-teaching process fully controls the outcomes of what happens in the classroom. Experimenting is understood as a way of opening ourselves to the unknown, to the unpredictable. Experimentation fully embraces an affirmative ethics of potentiality (Braidotti, 2009),

and it entails imaginative and creative ways of dealing with inequality and power relations within the classroom. Unexpected outcomes are a catalyst for something new emerging within open-ended processes of becoming. Within this perspective, the classroom is understood from the perspective of relationality and intra-activity: it is an assemblage, a complexity of networks of human and non-human actors where unexpected encounters happen and where difference and multiplicities (such as different backgrounds or different neurodiversities) are celebrated as productive, affirmative, constitutively entangled. Within this perspective, the classroom is understood as a rhizome (Strom & Martin, 2015), an assemblage, or a complexity of relational networks. A pedagogy of vulnerability challenges teachers to render their frames of knowing, feeling, and doing vulnerable; it also challenges students to involve themselves in the process of teaching-learning.

Vulnerability has been one of my topics of interest in the last few years (Cano Abadía, 2014, 2016, 2017, 2020, 2021), reading from various sources and focusing on theoretical approaches from different feminist authors such as Judith Butler (2003, 2006, 2009, 2015), Athena Athanasiou (2014, 2016a, 2016b, 2020), Estelle Ferrarese (2016, 2017), Erinn Gilson (2014), or Magdalena Górska (2016). During my research on vulnerability, I have been developing a diffractive reading that results in what we have called "a posthuman vulnerability" (Hernández Domínguez & Cano Abadía, 2021). It is a take on vulnerability that tries to find the points of friction and convergence between different perspectives which see beyond the negative aspect of affectability –as susceptibility to being harmed or suffering from disease. Instead vulnerability is the very condition of possibility of being affected; a constitutive openness that is related to our relationality and exposability. According to this perspective, we are all affected by others– we are not invulnerable, but we are open and susceptible to being affected. The fantasy of invulnerability (Ferrarese, 2016) is a fable that has to be rewritten in terms of non-dualist relationality, affectability, and interdependence.

The course "Vulnerability, Gender, and Justice" originated from a Conference by the same title that I organized that addressed the multilayered dimensions of vulnerability, intertwined with matters of gender and justice. The Conference took place in Graz, Austria on July 17-18, 2019 at the Section of Political Philosophy at the University of Graz. It fostered interdisciplinary perspectives within contemporary feminism that

provided analytical tools to understand vulnerability and precarity, while also exploring the possibilities of agency and critical engagement with social relations and institutions.

After the organization of this Conference, I was given the opportunity to teach a course on the topic. Due to academic knowmadism (Cielemecka & Revelles- Benavente, 2017) and a short post-doc contract, this was a one-time course that took the form of a Proseminar, which in Austria are courses that allow only up to twenty-five students who are expected to participate actively in class. I decided to try an affective approach with this group because of the small number of students, and because of the topic we were discussing −given that we were going to focus theoretically on the topic of vulnerability, we should also try a vulnerable approach to the process of learning and teaching. In order to prepare for this concrete experience, I started to systematize my thoughts on teaching and on being vulnerable together. During the course, I initiated a practice of self-study to reflect on my own practice in intra-action with my students. The practice of self-reflection is ongoing and open-ended, and it has accompanied me until today. I paid close attention to how our affective energy was created and the flows were distributed as our bodies shared a space and collided there. Applied to the teaching of "Vulnerability, Gender, and Justice," my theoretical framework −in which diffractive reading, vulnerability, and rhizomatics are key elements− enabled stimulating co-learning experiences that challenged traditional conceptions of the teaching of philosophy.

Embracing vulnerability during this learning-teaching process had an affective dimension. It is not only about understanding it theoretically, being aware of its existence and occurrence in our lived experiences. Embracing vulnerability has to do with being ready to embody the messiness of being vulnerable: deeply feeling that being open to others undoes and redoes ourselves −it is an amorous and fatal process. This is related to what Monika Rogowska-Strangret (2017, p. 18) calls the "vulnerability of the self" that requires an unpacking of the self through shared vulnerabilities. It has to do with embracing deep connections and profound relationality that take into account our mutual interdependence. It implies recognizing how we are enmeshed with others in a way that makes us wonder who we are. Where

are the limits of my existence? Where do others start? What is mine? Do I even have something that is "mine" or is it all shared with others? Undoing and redoing oneself in such a way is an ongoing open-ended process. A process that is panic-inducer, anxiety-provoking, daunting, nerve-racking, and also full of wonders.

This paper is divided into three parts that correspond to three aspects related to our openness and relationality and that deal with three different aspects of this affective pedagogy: diffractive reading, vulnerability, and rhizomatic thinking.

Diffractive reading

The scientific term *diffraction* concerns the bending and spreading of waves when they combine or meet an obstacle. Water, light, and sound all exhibit diffraction under the right circumstances. This diffractive spreading and bending have been used as a metaphor for certain innovative feminist methodological approaches. As Karen Barad suggests (2007, p. 73), diffraction is a physical phenomenon that can inspire a new reading strategy.

Donna J. Haraway (2004) was the first author to formulate diffraction for feminist academic purposes, proposing this metaphor as a feminist tool to rethink difference/s beyond binary opposition/s. Inspired by physical optics, Haraway adopted diffraction to shift our understanding of difference/s from oppositional to differential, from static to dynamic, and our ideas of knowledge from reflective judgment to embedded involvement.

Barad (2007, 2014) further explores the creative possibilities of a diffractive methodology. She understands it as a reading strategy that goes beyond the dialectics between schools of thought and allows us to affirm similarities between seemingly opposite schools of thought. For Barad, diffractive reading involves close, attentive, and care-full readings of each other's work to affect and be affected by each other.

Diffraction intends to go beyond the repetition of the same and "does not produce 'the same' displaced, as reflection and refraction do. Diffraction is a mapping of interference, not of replication, reflection, or reproduction. A diffraction pattern does not map where differences appear, but rather maps where the effects of difference

appear" (Haraway, 2004, p. 70). Diffraction focuses on differences and it is related to an ethics of affirmation (Braidotti, 2009) that moves beyond paralyzing criticism and transforms negativity into activity. A number of shifts are necessary: from negative to affirmative, from entropic to generative, from incomprehensible to virtual wanting to be actualized. Diffractive methodologies allow for these shifts to happen, as they are open to new actualizations and generative knowledges. In this sense, it is important to build bridges and develop (theoretical) alliances. As Iris van der Tuin argues (2011, p. 27): "It [diffractive method] allows us to affirm and strengthen links between schools of thought or scholars that only *apparently* work toward the same goal. It is a strategy with which new concepts or traditions, new philosophies, can be engendered."

Diffraction disrupts the temporality of our trains of thought, transverses disciplines, and can change conceptual meanings in different contexts. When brought to learning-teaching processes, diffractive methodologies are useful to foster conversations between different texts that can belong to different authors and (often opposing) disciplines or schools of thought. This is relevant when designing the syllabus: diffractive methodologies invite us to incorporate differing frames of thought and proposing topics from divergent perspectives. In this sense, it also enables the designer of the syllabus to be more creative and to escape coercive theoretical and disciplinary frameworks that might exclude certain authors because they seemingly do not fit in. The scope of topics and perspectives that can be tackled in class is broadened; and not only synchronically but diachronically as well: diffractive methodologies are concerned with acknowledging the value of past, present, and future contributions to knowledge. They elongate the temporality of theoretical debates and conversations.

Applied to contemporary feminist theory, "diffraction is often employed figuratively, to denote a more critical and difference-attentive mode of consciousness and thought" (Geerts & van der Tuin, 2016). Diffracting, rather than reflecting, produces "more promising interference patterns" (Haraway, 1997, p. 16) or, in Barad's words: "patterns of difference that make a difference" (Barad, 2007, p. 72). This opens up new possibilities and takes us to unforeseen scenarios. These interference patterns create

differences that have the potential of disrupting the status quo established in university classrooms. Because of these interferences that disrupt traditional ways of doing, one has to be ready to be open to the unknown, to the chaotic.

 Despite the fact of having to pay attention to the relationship of a text with other texts and artefacts (van der Tuin, 2017), often coming from different perspectives, diffractive methodologies do not cause our attention to be spread thin. On the contrary, diffraction invites us to perform care-full readings of the details of texts. This is what I proposed to my students: a course based on diffractive readings on vulnerability and with the aim of encouraging them to become diffractive readers.

In my practice, bridging together different disciplines has been a key element: I was a feminist philosopher trained in post-structuralisms, queer theories, and intersectionality, with an ever-growing research interest in new materialisms and critical posthumanisms for the last decade, teaching at an institution that heavily focuses on analytical philosophy. My background was completely different from the theoretical and practical background that my students were used to seeing in their professors. When planning the syllabus, I had to take this into account: my students were most likely unfamiliar with many of the philosophical traditions and concepts introduced in this course; at the same time, the connections they made often referred to liberal political philosophy. I had to be ready to discuss the concept of vulnerability, for example, taking into consideration John Rawls' concept of the veil of ignorance (Rawls, 1971). This enriched the conversations we had, which went into directions that I would not have been even able to anticipate. Furthermore, it disrupted the usual way in which philosophy was being taught at that institution, and how I was used to teaching feminist theory.

The aim of the discussions during the "Vulnerability, Gender, and Justice" course was to co-create new diffraction patterns in the understanding of our own vulnerability; not only as a philosophical, theoretical exercise but as an affective experience that has an impact on our very understanding of our situatedness in the world through exposing the vulnerability of the self (Rogowska-Strangret, 2017). Through these diffractive readings of vulnerability in the classroom, we could disentangle the complexity of

relationality and affectability. Our situatedness in that classroom was the scenario in which this particular, collective diffractive reading of vulnerability took place.

In the first session, we discussed the syllabus with the thematic topics that we would be working on during the semester. I also explained my situatedness as a post-structuralist scholar in an institution that was heavily oriented towards analytic philosophy and where feminist scholarship was scarcely taught to students. The readings were from authors that do not belong to one discipline or school of thought, and some of the readings are texts with which I do not theoretically agree. Some of the authors belong to the mainstream tradition taught at our institution while others belong to frames of thought completely alien to my students.

The course started with a general presentation of the concept of vulnerability. As a first exercise, the students were invited to brainstorm and co-produce a word cloud with concepts and ideas with which they associate "vulnerability." Many of the concepts referred to weakness (abandoned, alone, danger, discrimination, dispossessed, exposed, helpless, neglect, poverty, precarious, risk, unprotected, weak), while others were linked to resilience and empowerment (connection, feelings, growth, honesty, openness, self-reflection, strength). The readings after this exercise (Ferrarese, 2016; Butler, Gambetti, & Sabsay, 2016) presented a concept of vulnerability that tries to escape the binarism between vulnerability (associated with nature, passiveness, and femininity) and resistance (associated with the political and social world, action, and masculinity). Instead of reproducing the nature-social circle (Ferrarese, 2016), these authors propose a naturecultural (Haraway, 2003) rendering of vulnerability and that breaks the dualism that has traditionally been established between vulnerability/resistance, weakness/strength, passivity/action.

The second step was an invitation to think about vulnerability as a shared condition that stems from our (human) embodiment, our relationality, and our openness. This was accompanied by an explanation of a Spinozian understanding of the process of individuation, which is an affective process of inter-dependency. Readings from Judith Butler (2003, 2012) and Elodie Boublil (2018) were presented at this stage. Many of the concepts that appeared on the students' word-cloud (e.g. poverty, discrimination, neglect) were related to precarity (Butler, 2009), understood as a differential

distribution of vulnerability along certain axes of power, privilege, and oppression (related to gender, ability, class, geopolitical issues, sexuality, etc.). To delve into this aspect of vulnerability, we read together Butler (2009) and the collective work of Catriona Mackenzie, Wendy Rogers, and Susan Dodds (2014). The last part of the course was dedicated to critically assess what to do with vulnerability. From legal theory, Martha Fineman (2008, 2010) advocates a responsive state that protects our constitutive vulnerability and criticizes the shortcomings of liberal theories of justice. From a critical posthumanist perspective, Rosi Braidotti (2009) approaches the concept of vulnerability with scepticism and puts forward an ethics of affirmation, while Athena Athanasiou (2016a) responds to her proposition by affirming the power of mourning to articulate political resistance.

Vulnerability

Feminist philosophers have conceptualized vulnerability as a constitutive feature of our human condition whilst acknowledging its differential distribution. Butler (2006) proposes to differentiate between ontological vulnerability −precariousness,− and socially and culturally produced vulnerability −precarity. Precariousness is an ontological shared state of humanity, a condition of susceptibility to being harmed. This theoretical formulation is a consequence of her Spinozian stance on the relationality of subjects (Butler, 2015): we are all interdependent, thus, we are affected by others, and we affect others; thus, affectability −understood as unqualified interdependence when considering a global community (Dotson & Whyte, 2013, p. 55)− is a crucial part of vulnerability. We are vulnerable to others: we are open to others. Precarity, on the other hand, is the "politically induced condition that would deny equal exposure through the radically unequal distribution of wealth and the differential ways of exposing certain populations (…) to greater violence" (Butler, 2009, p. 28). With this distinction, Butler shows that vulnerability is systematically increased and geopolitically distributed according to differing socioeconomic conditions that should be addressed in order to understand the precarization of certain (gendered, sexualized, racialized) populations. On the one hand, vulnerability is universally shared, it is an ontological feature of our existence. Vulnerability, understood as

affectability, relationality, and interdependency, is inevitable. On the other hand, highlighting the importance of concrete conditions of precarity, vulnerability is understood as pertaining to the lived, situated body. In this sense, it is understood that the lived body experiences its vulnerability through its exposure to others and the world.

For Butler (2009, p. 33), "the body is a social phenomenon: it is exposed to others, vulnerable by definition." Vulnerability is not thus reducible to injurability; rather, it is a response to exteriority, an affectability that precisely animates responsiveness to the world. Our own survivability depends on our relationality. In this sense, it is crucial to develop a conception of ourselves that focuses on recognising how we are bound up with others.

Elodie Boublil (2018, p. 183) defines vulnerability as follows: "A multifaceted concept depicting our relational and embodied nature (ontological vulnerability) and our necessarily situated and unpredictable existence (situational vulnerabilities)." For her, as for Gilson, vulnerability describes the very structure of subjectivity, its "trascendental condition, pointing to an openness and plasticity that makes possible transformation" (Gilson, 2014, p. 10). Vulnerability is always relational –it always presupposes openness and exposure to the world and to others. This relationality, this openness, structures the subject's experience of the world. That being so, vulnerability is not only susceptibility to being affected; it is also a capacity to be sensitive to the world and others. Vulnerability is a mutual experience: one is always vulnerable to others, vulnerable before somebody else.

We are thus open to being affected through this interdependence and responsiveness to others. We are vulnerable to being changed through our interactions and intra-actions with others, to undergo a process of re-making through our engagements with others. We are not only vulnerable to one another but also institutions and economic, social, and cultural relations. For Butler, the starting point for morality is not the self-transparent, invulnerable self; rather, it is a subject that is always constitutively entangled with others. The acceptance of vulnerability as constitutive fosters modesty, generosity, patience, tolerance, and forgiveness (Butler, 2003: 54-56), virtues that work against ethical violence that results from complete self-coherence and

fictions of invulnerability that do not consider our constitutive relationships with others.

When applied to pedagogy, this conception of vulnerability, understood as relationality and affectability, challenges teachers to be open to being affected (emotionally, intellectually, physically, all intertwined) by the intra-actions with what surrounds them in the classroom. It challenges students to escape the traditional conception of students as passive beings and to be actively involved in the processes of teaching-learning. This is not an easy task: it entails inhabiting positions that are not traditional, and this self-estrangement can cause discomfort. In this sense, embracing vulnerability in pedagogical settings in higher education entails acts of collective courage. Furthermore, it requires to be aware of precarity and differential distribution of vulnerability; for this, it is necessary to contextualize the self and knowledges in societal structures and power relations. In this sense, a pedagogy of vulnerability is in debt with Haraway's concept of situated knowledges, which raises awareness that the particular and embodied perspectives of the knower are always present in knowledge despite it being presented as objective (Haraway, 1988). Accepting vulnerability, relationality, interdependence, affectability comes with a commitment to being open to others and our surroundings. It invites us to open ourselves to share with others.

Teaching and learning, then, are not simply teaching and learning; rather, both processes intra-act in an open-ended way. In this sense, we can talk about co-learning and processes of learning-teaching. Adopting and intra-active attitude towards co-learnings requires practicing critical self-dialogue with our own practices and systems of thought, questioning our assumptions and preconceived ideas, values, and normalized behaviors. Through this process, I discovered that teaching constantly requires un-learning and re-learning. Processes of learning-teaching are dialogical, relational processes that enhance and value the insights and knowledges of all involved. It fosters participatory engagement that has the potential to be empowering.

Receiving and providing ongoing and nurturing feedback becomes an integral part of relational processes of learning-teaching that must be built on continuously negotiated, shared norms. Giving and receiving honest feedback also means accepting that we do not know certain things, or that we can all be wrong −including

people in a position of authority who are supposed to be the cognoscenti. In the classroom, this translates into an open invitation to share our emotions and thoughts openly, without fear of retaliation (e.g., a student that has constructive criticism about the contents of the course should be able to voice their concerns). This contributes to building a climate of trust and practice of self-reflection. By inviting this shift in the conceptualization of our vulnerability, and understanding it as constitutive and relational, we can learn, teach, research, and live differently in a more intra-connected way.

One way of trying to implement this intra-connection in the classroom was opening up ongoing feedback loops, which included me receiving feedback from my students as well: the feedback was not hierarchical or uni-directional. In November, we had a long checking-in session. I asked course participants to write down their 1) anxieties 2) accomplishments to be able to determine how they were doing. I did the same. I told them that they could share if they wanted but 1) it was not mandatory 2) it could be with a partner, it did not have to be with the whole group 3) if they wanted to vent, first they needed to ask their partner if it was all right, if their partner was able and willing to share concerns. During this session, some of them gave me feedback on how they perceived their performance in the seminar. I also asked them for feedback on my corrections and comments to their weekly tasks. One student told me that she thought it was sometimes too short and that she wanted longer comments from me. I welcomed this criticism as a way of being confronted with the practice of co-learning. It challenged my way of doing things thus far and it allowed me to reconsider some of my choices concerning the correction of written tasks.

This is what I wrote as answers to the questions listed above, which I shared out loud with the group afterward:

> 1) My anxieties: I am worried that you [my students] will not like how I planned this course. I feel vulnerable by sharing with you this right now. I worry that you will think that I am trying to overdo it and that you will think that trying to have this openness in the classroom is weird or unnecessary. I am also concerned about what my co-workers and bosses will think: I am in a precarious position, my continuation at this institution is not assured; I

fear they will think I am not a good fit; at the same time, I am actively trying not to fit in, and to create some change, even if taking very small steps.

2) I am very proud of this course, and I am proud of all of you and the work we are doing together. This is not another course like the others to me: I took the conscious decision of trying to do something different here, and you are helping me incredibly to reflect on my own practice.

From this shared self-reflection exercise, I understood that this process of un-learning and re-learning together made me uncomfortable; it made all of us uncomfortable. Personally, there was some uneasiness stemming from my situatedness as a young, female academic: I felt pressure to perform in a certain way −e.g., serious, authoritative− to be taken seriously, but I chose to perform otherwise. I felt I was putting myself in a risky position by consciously not reproducing the cultural atmosphere and theoretical interests of my workplace. Collectively, we felt that we had to do something odd, something unusual; it was not something radically alienating, it was something different enough that made us feel that a line of flight was being created. Some of my students told me after the course that they wanted to leave after the presentation on the first day because the course was not what they were expecting; nonetheless, they chose to stay out of curiosity; they chose to stay with the trouble. We all chose to stay with the discomfort. We navigated it. We embraced our constitutive vulnerability, embraced the unpredictable, let go of expected outcomes, let go of fictions of mastery. We got anxious, we relaxed, we got anxious again; we enjoyed, established relationships, discovered affinities, looked at each other's eyes, laughed together, questioned each other, dared to speak up, dared to sit back and listen, learnt how to occupy less space, were aware of ways in which we were not taking care of each other, were proud of ourselves, enjoyed being together in that temporary, vulnerable rhizome.

Mid-semester, in December 2019, I presented a more elaborated version of the theoretical framework or the affective pedagogy of vulnerability −a draft of this text− and asked my students for feedback. That day, our following collective discussion about an affective, diffractive, rhizomatic pedagogy of vulnerability was long and interesting. I even received feedback about these topics and our co-learning

experiences via email from students that could not attend that session. I also received some criticism about things that could be changed −e.g. elaborating more my written feedback on the tasks that they handed over or some changes in deadlines− and we came up together with solutions through agreements, negotiations, and discussions.

With these ongoing feedback loops, I had to remain open to others and welcome potential lines of flight −even those which I would not anticipate or appreciate. I had to try to control less the outcomes, to be more flexible to welcome the idea that the seminar was going to change in intra-action with the students and that we had to design together transitional responses to our environment. I had to open myself up to the random, the unpredictable. The syllabus had to be more dispersed, more dynamic. We all had to −chose to, in a way− be more responsive to each other, navigating between molarity and molecularity and allowing ourselves to share our vulnerability.

The embodied experience in processes of learning-teaching is fundamental, especially when discussing vulnerability and trying to implement a vulnerable approach to pedagogy. The classroom is an assemblage of the forces and bodies that intra-act in a confined space during a co-learning session; forces and bodies that are vulnerable to each other. How the bodies are situated in the assemblage matters: if bodies are allowed to move, if they effectively move, how they move, the relationships that are established between them, how they attract or repel each other. The physical pre-established setting of the classroom had a semi-circle of tables and then some other tables on the left side of the classroom, as the room was not big enough to fit all the tables into a circle. I noticed that an extra effort had to be done to include those who often sat on the side of the semi-circle. For instance, the attendance sheet that was circulating the classroom sometimes got stuck in the semi-circle and did not reach those tables on the side. I asked them to please take care of each other and make sure they were communicating and double-checking if everybody had access to the attendance sheet. That did not always happen. That made me reflect on how important the position of the tables was. That configuration immediately created a soft us-versus-them dynamics in which some people were considered as the outsiders, as an appendix to the unity of the semi-circle. It was very interesting to explore how to navigate these dynamics and take this as an opportunity to work on

how to create relations of care in environments and settings that do not provide the perfect conditions. We did the extra work, together, to share and take care of each other.

Rhizomatic thinking: lines of flight to share and care in academia

Inspired by Katie Strom and Adrian Martin's work (Strom & Martin, 2015; Strom et al., 2018), rhizomatics is another key element of the conceptual development of this pedagogy of vulnerability. A rhizome is, as conceptualized by Deleuze and Guattari (1987), a way of mapping relational and networked thought processes. In this sense, "the rhizome is any network of things brought into contact with one another, functioning as an assemblage machine for new affects, new concepts, new bodies, new thoughts; the rhizomatic network is a mapping of the forces that move and/or immobilize bodies" (Colman, 2005b, p. 233).

Rhizomatic thinking has to do with open-ended configurations and random and unexpected relations. All the parts of a rhizome are interconnected and engage in complex intra-actions. That being so, a rhizome has no center, no hierarchy, no unique entry point. When applied to thinking and writing, rhizomatics does not try to assimilate systems of thought but is rather attentive to open-ended and constant conceptual transformations. As a relational network, it allows forces and desires to flow throughout it.

The decentered rhizome is opposed to arborescent and hierarchical thought, and it allows conceptualizing an ontologically different theory: all bodies are only possible to be thought in their polymorphous inter-dependence and intra-relation; in their affective, relational movements with other bodies. This ontologically different theory is neomaterialist, monist, and relational, and is useful to understand education phenomena as complex and multiplistic. As Strom and Martin (2015) suggest, any situation involving multiple elements that connect and intra-act in some way, resulting in social activity, can be understood as a rhizome. For instance, the classroom can be understood as an assemblage of multiple human and non-human elements connected to produce teaching-learning experiences. Understanding a classroom as rhizome works against the usual conception of students as passive, receiving beings, and

teachers as active, communicative beings who possess knowledge and transmit it. It works against the hierarchization of educational settings. In this sense, it was linked in my practice with being vulnerable together and thinking/reading diffractively. I was, of course, in charge of the course and that put me in a position of power that is inherent to the highly formalised and hierarchically structured context of academia; nonetheless, my attitude of openness went beyond merely listening to the students' feedback by considering their inputs as valuable knowledge and contributions.

The rhizome opens up the possibility of the reassessment of any form of hierarchical thought or activity and entails a challenge to the status quo of common-sense thought (Deleuze, 1994, p. 129–168). In *Difference and Repetition*, Deleuze presents common sense as one of the foundations of the dogmatic image of thought that dominates the philosophical tradition. According to the dogmatic image of thought, everybody makes sense of things the same way and there is no room for thinking differently. Snir explains that for Deleuze dogmatism characterizes philosophy from its very beginning and that "it not only uncritically accepts certain views as true; it does so while assuming it trains students for critical thinking, but in fact only legitimizes a pattern of thinking saturated by these very assumptions" (Snir, 2017, p. 301).

Perpetuating common sense, which takes the form of rational humanism, is morally questionable. Common sense is not rhizomatic –it is arborescent thought. This arborescence fosters too simplistic frames of thought that reproduce themselves. These simplistic frameworks present themselves as neutral and universal, but they are immersed in western, white, Christian, heterosexual, male-centered, and otherwise biased frames of thought. Rhizomatics intends to challenge this alleged universalism of good and common sense by fostering multilayered, complex, relational networks in which all the elements are entwined and engaging in multiple intra-actions. Thinking rhizomatically offers a way to think about the world in more complex terms. The rhizome serves as a model to try to shift dogmatic ways of thinking from trying to create and disseminate totalizing systems of thought to frameworks that are contextual, multilayered, complex, and susceptible to change.

Rhizomatics also allows us to think about affective transformation within the classroom. Affect is the capacity of a body to act when it is embedded in a particular

multiplicity; it is the motor of being. Affects are pre-personal, prior to conscious thought, and are multiple forces between (Deleuze, 1988). Affective forces flow rhizomatically:

> Deleuze's apparatus for describing affective change is the "rhizome". Deleuze viewed every operation in the world as the affective exchange of rhizomatically-produced intensities that create bodies: systems, economies, machines and thoughts. Each and every body is propelled and perpetuated by innumerable levels of the affective forces of desire and its resonating materialisations. (Colman, 2005b, p. 234).

In rhizomes, there are molar and molecular lines. Molar lines are macro-level forces that reinforce normalized movements and frames of thought. Molarity is limiting and constraining, as molar lines are too rigid, too coercive, too fixed, and inflexible. In this sense, they create striated space, as they create barriers to creativity or non-conformity (Strom & Martin, 2015). Molarity recaptures and redirects lines of flight – understood as temporary breaks from the norm– to return them to normative frameworks of thought.

Molar lines are too present in the traditional way of teaching philosophy. Normalized educational processes are "too regular, petrified… the most skeletal and least interesting" (Deleuze and Guattari, 1994: 83). In the particular case of institutionalized philosophy, the philosophical canon is too rigid both in content and form. The content is colonial and racist (Harding, 1992; Davis, 2017, Van Norden, 2019), Western-centered (Young, 2015), and androcentric (Flax, 1983; Griffiths & Whitford, 1988; Landau, 2006). The way in which philosophy is taught is also too fixed, based on the repetition of inherited ideas (Unger, 2014; Guess, 2014). Academic institutions seem to have ignored Deleuze & Guattari's (1994) consideration of the discipline as a framework that aims at the creation of new concepts with which to understand and re-frame the world.

Nonetheless, educational settings deal not only with molarity but with molecular lines as well, as the actual micropolitical work is done in everyday situations. Molecular lines are, contrary to molar lines, supple and flexible. They are adaptable, malleable, and intervene at micropolitical levels. Their movement and level of actuation differ

from molarity, but that does not mean that molecular lines necessarily go against molar norms.

Rhizomes, moving often unpredictably within molecular and molar lines, have the potentiality of opening lines of flight. This deviation from normativity can be distressing:

> As earth-bound creatures, taking flight is always terrifying for the first time. It is as if we are changing our natures, relying on navigating a set of unknowns to hold us up and prevent us from plummeting to our demise. Taking flight requires that we become creative actors, constantly changing and being open to working with different, unfamiliar factors and complex multiplicities. (Bayley, 2018: 7).

Molecular micro-actuations can move in two directions: on the one hand, they can reinforce the work of molarity and reproduce normalized patterns and frameworks; on the other hand, they can create lines of flight that potentially escape from rigid norms and create something new. Lines of flight are not necessarily positive. Nonetheless, they are deviations from the norm and, as such, they have the potential to transform the status quo if they are repeated over time. Pedagogical environments that allow molecular transformative actions to happen create lines of flight that deviate from molarity and have the potential of modifying educational institutions. These molecular actions, potentially transformative, require thinking with different concepts, reading different texts, daring to fly away from institutional rigiditya and let go of the idea of achieving planned outcomes. A proseminar is supposed to foster the active participation of students; therefore, it provides an environment in which potentially transformative lines of flight could be open. The syllabus provided a certain structure; nonetheless, the syllabus itself was open for discussion and the teaching methodology based on shared vulnerabilities (Rogowska-Strangret, 2017) and diffractive readings generated the possibility of lines of flight. Conceiving the classroom as a rhizome in which there are molar and molecular lines intra-acting, less hierarchical interactions were allowed. In the molecularity of our teaching-learning experience, there were constant and ongoing feedback loops that eased the institutional hierarchy. It would be naive to argue that hierarchical interactions were

eliminated or disturbed; nonetheless, I believe that the divisive lines were at least blurred through sharing and caring, discussions and agreements.

After we discussed the theoretical framework that would accompany our analysis of the concept of vulnerability during the semester, I proposed a distribution of workload, which we discussed together to come up with an agreement and commit to a way of working. I would propose weekly readings; for each reading, I prepared guiding questions and encouraged them to propose any other questions or comments they had about the texts. Each week, they would have to read the text and answer in writing to the guiding questions. These guiding questions were used in class to facilitate discussions; students could also hand them in and I would comment on them so that they would receive ongoing feedback from me. Despite having guiding questions available , students were encouraged to search for lines of flight and to become diffractive readers by connecting the texts with their own experiences or different readings, artwork, novels, tv series, etc. This approach was inspired/informed by van der Tuin's idea of a diffractive reader:

> Diffractive readers do not care about canonical renderings of texts or of artefacts because they zoom in on how texts, artefacts and human subjects interpellate or affect each other. Instead of submissively following a (counter-)canon, diffractive readers ask how texts, artefacts and humans may inform each other as a result of their preconscious or sub-subjective entanglement (van der Tuin, 2018, p. 101).

I find guiding questions useful for several reasons. Often, some of the students had not previously read much philosophy. The guiding questions have the benefit of helping them to focus on the information that is going to be specifically tackled in the next sessions. Also, guiding questions help facilitate group dynamics during the session in which the text is analyzed. We usually started the session with my suggestion to work in pairs or small groups to discuss their answers to the guiding questions. They came to class with their short-written task, and they used the originally proposed text and their work on it to create conversations and discussions about it. During these group discussions, the figure of the teacher with authority is somehow blurred and disappears from the podium. I did not participate in any group,

but I wandered around; I would eavesdrop and take notes to address certain issues I felt were interesting for them during the following collective discussion. They knew they could ask me anything also during these small group discussions, but they often kept absorbed in their own conversations. Conversations were lively –they always seemed to have something to talk about. Students intra-acted, formed relations, found affinities, generated lines of flight that diverged from traditional philosophical praxis in higher education. They created emotional and intellectual clusters of interest. They opened up. It is easier to speak up when working in pairs of very small groups than to talk in public, to the general group; so, in this sense, it fostered participation and facilitated the engagement of people in every session.

Special attention was provided to the specific molecularity of the classroom to understand micro encounters and differences. Working in pairs was encouraged, but not mandatory. They could decide if they did not want to pair up that day or ever. People have different needs, and we have to take into account and respect their boundaries. Many group activities are very invasive and difficult to perform for neurodivergent or neurodiverse people (Rentenbach, Prislovsky, & Gabriel, 2017). I myself find it very hard to talk when there is a lot of noise around, especially when there are different conversations in different languages in the same room, and I cannot focus. Difference is not considered here as the inclusion of diversity, or paternalistic adaptation of "normal" work to "atypical" people: difference is considered as a constitutive multiplicity of the classroom, and practice is shaped in the intra-action of *all* the elements that are involved.

Another pursued line of flight was to generate different classroom dynamics when it came to mental health, sharing and caring for each other, and creating a space where our shared vulnerabilities mattered. In order to do so, I shared my own experience with anxiety and how it affects me privately and professionally, and a well-being statement was included in the syllabus and read together during the first session of the course. By doing so, it was made explicit since the beginning that our well-being was a priority

during the semester. Making it explicit already made a difference, it became to matter. This is the content of the wellness statement:[1]

- Working until exhaustion is NOT a badge of honor; it shows that you are out of balance.
- You are given a free pass to skip ONE weekly writing assignment. This "wildcard" allows you to assess your workload and make good choices on priorities.
- You can respond and share your progress on wellness in class. Please, feel free to share (if you think you are overworked, if you are proud of how you are managing your schedule, etc.). Using five minutes of class time for this purpose will help you focus on prioritizing a more balanced practice of work, and we will hold each other accountable.
- We will incorporate movement breaks into the sessions so you are free to respond to your needs and regain your focus.
- Please share with me your ideas and feelings so that I can improve. Integrating wellness into the classroom is a cultural shift and we are all navigating uncharted waters, so it might feel weird. Stay with the weird. Let's do this together.

Every session started with a round in which we could share, if desired, how we were feeling and what was on our mind/body. I usually started the round and shared something about my state of mind that day; at the beginning their sharing was slow but soon that round became a moment in which they would share thoughts, joys, fears, or expectations. We introduced similar rounds to talk about our impressions of the texts and our general affective response to the readings. This allowed us to co-create a shared vulnerability in the classroom. By sharing, we realized how we were affected by what others said, by the texts, and how we could affect others as well. Our relationality and intra-activity mattered there.

Concluding remarks

Processes of teaching-learning are something amorous and fatal, something that exposes our constitutive vulnerability and inter-dependency by inviting us to share and care for each other. Explicitly sharing our vulnerabilities unveils our exposability, affectability, relationality. We get done, undone, and re-done by this openness, as our

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[1] Based on a wellness statement shared by Nicole Gonzalez Van Cleve on her twitter account. It can be found here: https://twitter.com/nvancleve/status/1168955364982841344?lang=en

bodies get re-articulated in affective movements with other bodies. We become other with others.

The aim of this course was to activate potential lines of flight that may result in different theoretical-practical approaches to philosophy in academic settings; lines of flight that could help understand the classroom as multiplicities of affective intra-actions. Diffractive reading, vulnerability understood as affectability, and rhizomatics can potentially transform our way of reading, of understanding ourselves, and of understanding how we are situated in practices within molar and molecular lines.

The results of this experimental proseminar might be modest, generating −if any− tiny variations regarding the philosophical canon. Also, these tiny variations could not be sustained in time, or replicated, or generated again, or generated in any other way, as it was, unfortunately, a one-time course. Nonetheless, any variation has the potentiality of generating something new and it for sure made me embrace this amorous and fatal process of teaching-learning paying closer attention to the affective flows that are generated in a classroom.

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Becoming-cat or what a woman's body can do

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Abstract

Drawing on a body of literature that considers narrative meaning emerging in intra-species entanglements, in this paper I read Gwen John's letters revolving around her relationship with the many cats she lived with throughout her life. I am particularly interested in throwing light at moments when a woman's body makes strong connections with the animal's body blurring the boundaries between humans and non-humans through a cosmological ethics of care. In doing so, I follow trails of Deleuze's and Guattari's idea of becoming-animal, as it is fleshed out through a narrative analysis of a modernist woman artist's letters.

Keywords

becoming-cat; intra-species encounters; holey spaces; letters; narratives women artists

Epistolary narratives of intra-species relations

> I learnt so much at those two visits. I didn't know how much till now. Some things I had found out but it was satisfactory to have them confirmed and expressed well. For instance, I said 'a cat or a man, it's the same thing', you looked rather surprised. I meant it's an affair of volumes.[1]

In August 1936 Gwen John, wrote to her friend Ursula Tyrwhitt, a letter containing a significant albeit strange statement: 'a cat or a man, it's the same thing … it's an affair of volumes.' What did she mean by that? A careful examination of her correspondence indicates that the extract above concentrates in a rather radical and provocative way John's ideas around art in general and painting techniques in particular. In this paper I read John's letters revolving around her relationship with the many cats she lived with throughout her life. I am particularly interested in throwing light at moments when a woman's body makes strong connections with the animal's body blurring the boundaries between humans and non-humans through a cosmological ethics of care. In doing so, I follow trails of Deleuze's and Guattari's idea of becoming-animal, as it is fleshed out through a narrative analysis of a modernist woman artist's letters. The paper draws on archival research I carried out with Gwen John's two extended bodies of correspondence: a) her love letters to Auguste Rodin, housed in the Archives of the Rodin Museum in Paris; and b) her letters to her friend and fellow student at the Slade, Ursula Tyrwhitt, housed in the National Library of Wales at Aberystwyth.[2]

Gwen John (1876-1939) was born and grew up in Wales and her talent for painting was supported by her middle-class family. She studied at the Slade School of Fine Arts in London but lived and worked in Paris and the nearby Meudon from 1904 till the end of her life. She met Auguste Rodin while posing as a model for a monument to Whistler and fell passionately in love with him. During the ten years of their affair (1904-1914) and beyond it, till Rodin's death in 1917, she wrote passionate letters twice and sometimes three times a day. As a young artist John lived in a series of studio apartments in the Montparnasse area, which were usually the epistolary places her

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[1] NLW MS 21468D, ff.180v.

[2] I have written elsewhere about the epistemological challenges and methodological approaches in doing narrative research in the archive from a new materialist perspective, but there is no space to expand on this within the limitations of this paper (see Tamboukou, 2016).

letters were written from. John's love letters to Rodin are extremely interesting both in content and in form; they offer rich insights in the minutiae of a young woman artist in the urban spaces of modernity. Her letters about her cats are included in this body of correspondence.

Although John's work was mainly revolving around portraits of women and young girls, her art had moved beyond the conventions and constraints of figurative painting: portraits were merely treated as pictorial problems, Cézannean motifs, canvasses for experimentations with lines and colours. (see Foster 1999) In this context 'a cat or a man is the same thing' for a painter: visual images releasing sensations and forces. Yet, the juxtaposition of the figure of 'the man' to that of 'the cat' as an exemplifying metaphor for the argument of the artist is not accidental in John's epistolary discourse. John lived surrounded by cats till the end of her life: she loved them passionately, wrote many letters about them and painted and drew them. Her emotional attachment to her cats has been well noted, documented and discussed in her biographies and biographical sketches (Chitty, 1987; Roe, 2002), always intertwined with sexual insinuations around her well-known affair with Auguste Rodin and her sexually ambiguous relations with other women, mostly artists:

> Flodin (also Rodin's lover) encouraged Gwen John to draw. She even invited her to share a model in the evenings … Once Gwen John infuriated Flodin by drawing her with a deep décolletage … Then Flodin threw herself on the bed and Tiger scratched her. She told Gwen it was a good thing she had a cat and not a baby. She'd look a fool going around with Rodin's brat on one arm and a cat on the other. Gwen John agreed it *was* a good thing. (Chitty, 1987, p. 70)

Moreover, John's cat paintings have always been included in her exhibitions and used as images for the Tate Gallery merchandise; hence we may drink coffee in a cup with the figure of one of her favourite cats, Edward Quinet, on it. What has been barely noted or discussed however is John's serious engagement with scientific discussions

around animals in general and cats in particular, as revealed in the following undated letter to Julie[3]:

> I read a book by Buffon that I bought at the riverbank last week, but I am disappointed with what I read in it. I had seen that he had a chapter on cats and that's why I bought it, since there are many things on natural history and I need to be educated. I don't think highly of Buffon at the moment. He has not observed cats well and the things that he says are wrong 'and that these animals, particularly when they are young and gentle, they have at the same time an internal badness, a pervert character that their training can only mask.' All this is wrong but I can see that someone who has not observed cats in a semi-wild or wild condition can have such an opinion. However, a naturalist has to observe more in depth. It's natural that people in general don't like cats as much as dogs; maybe because cats only love those who are good with them and they are not only interested in the human race like dogs, but they are interested in the entire nature. Therefore they are more independent than dogs. Moreover every cat has its own distinctive character like us. I have so much to say on this subject.[4]

There are many interesting observations and statements in the above extract. John's main argument is that Buffon's analysis does not seem to be grounded on careful observation of cats, particularly those 'in a semi-wild or wild condition.' Notwithstanding Buffon's recognition as the most celebrated naturalist of the eighteenth century, John considers herself much more knowledgeable on this subject, which means that she must have observed cats within urban environments and beyond. Her knowledge is experiential but allows for a nuanced analysis of the character of cats, particularly in comparison with dogs as perhaps the companion species par excellence. Moreover, although cats are initially considered as a species, they are not homogenized: like humans they have 'distinct characters' and in this light, they have the capacity of forming unique relations with other human and non-human animals. As put in another letter to Julie: 'the cat amuses me a lot when I am in bed,

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[3] Julie was John's imaginary confidante and her letters to Julie were actually addressed to her lover Auguste Rodin.

[4] MR/MGJ/B.J4 letters to Julie, undated, not localizable.

she talks a lot now in a way that is very expressive and totally different when she talks to me than when she talks to her kitten.'[5] What is further significant in John's perception of cats is their independence. Notwithstanding its anthropocentrism, what we can trace in John's discourse are metonymical signs of her own desire for independence as an admirable and perhaps unreachable state.

The recognition of difference as an ontological condition for humans and non-humans is therefore central in John's epistolary discourse around cats in general and her own cats in particular. Her relationship with her cats is tightly intertwined with the ethical consequences of this recognition of difference that Felix Guattari (1995) has lucidly theorized. Revisiting the project of subjectivity in his final work, *Chaosmosis,* Guattari has argued for an ethical choice "of being not only for oneself, but for the whole alterity of the cosmos and for the infinity of times." (1995, p.53) He has particularly stressed responsibility as an ethical stance that would re-establish broken connections between and amongst, humans, non-humans and the environment:

> How do we change mentalities, how do we reinvent social practices that would give back to humanity—if it ever had it—a sense of responsibility, not only for its own survival, but equally for the future of all life on the planet, for animal and vegetable species, likewise for incorporeal species such as music, the arts, cinema, the relation with time, love and compassion for others, the feeling of fusion at the heart of cosmos? (pp.119-120)

What I therefore argue in this paper is that John's desire to understand the feline and her engagement with cats as part of her everyday practices, creates a grounded exemplar of this ethics of responsibility and foregrounds gendered interventions in the ethics of responsibility and engagement with 'the cosmos'. Moreover, John's letters about her cat leave traces of *lines of flight*, attempts to escape constrictions and conventions of being in the world; they further deploy strategies to redefine conditions of existence laid down by the *molar* order and release intense forces of desire that leave her body free to affect and be affected and thus experiment with possibilities of *becoming other*.

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[5] MR/MGJ/B.J4 letters to Julie, undated, not localizable.

Lines of flight, molar orders and *becoming-other* are critical notions in Deleuze and Guattari's philosophical writings, particularly elaborated in their collective work, *A Thousand Plateaus* (1988). A common aspect in all these notions is an understanding of the world as an open-ended dynamic process, within which reality, power and desire are entangled in complex *assemblages*. Unlike institutions, structural systems, identities and axes of difference—which are the usual terms deployed in analysing the social—*assemblages* do not have any fixed organization, structure or centre; they are rather networks of connections, always in flux, assembling and reassembling in different ways. *Assemblages* are thus emergent features of relationships and can only function as they connect with other *assemblages* in a constant process of becoming.[6]

Deleuze and Guattari's theorisation of *assemblages* is actually traversed by different modalities of lines, including, *molar lines* keeping *assemblages* together, *molecular lines*, renewing and changing *assemblages* and finally *lines of flight* [lignes de fuit] that escape *assemblages* and connect them to the outside, thus initiating processes of *becoming other*. In Deleuze and Guattari's words: 'There is always something that flows or flees, that escapes the binary organizations, the resonance apparatus and the overcoding machine: things that are attributed to a "change in values", the youth, women, the mad, etc.' (1988, p.216)

Assemblages are further related to a group of spatial notions in Deleuze and Guattari's geophilosophy: *striated* and *smooth spaces, territorialisation* and *deterritorialization. Striated spaces* are hierarchical, rule-intensive, strictly bounded and confining. In this context, processes of *territorialisation* 'define or sharpen the spatial boundaries of actual territories' Manuel DeLanda has noted (2006, p.13), but they also work towards solidifying the often-moving grounds of the assemblage thus 'increasing its internal homogeneity' (2006, p. 13).

'But there are always forces of *deterritorialization, lines of flight*', Deleuze and Guattari *(*1988*,* p.474*)* argue, 'that shatter segmentarities and open up smooth spaces that are unmarked, dynamic and create conditions of possibility for transformations to occur' (p.474). Moreover, there is no dualistic opposition in this configuration; as a matter of fact, the world is being experienced as a continuum of striated and smooth spaces:

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[6] There is a burgeoning secondary literature around assemblages. For an overvieew see among others Kinkaid, 2020.

'smooth space is constantly being translated, transversed into a striated space; striated space is constantly being reversed, returned to a smooth space' (p.413). Processes of territorialisation are therefore always antagonistically related to processes of deterritorialisation, which 'destabilize spatial boundaries' (2006, p.13) and once again create earthquakes in the grounds of the assemblage.

In thus following *lines of flight* in John's epistolary narratives revolving around her cats, I trace the emergence of narrative meaning in discourses revolving around intra-species entanglements. David Herman's (2018) work on the importance of developing narratological theories that go 'beyond the human' underpins my own inquiries in letters that unfold within different frames of reference. How can narratives express modalities of experience emerging from interspecies entanglements, Herman has asked and how can narratological theory make sense of such encounters and their effects? In responding to these questions Herman has persuasively argued that 'telling different kinds of narratives about human's relationships with non-human others has the potential to alter understandings of our place within a more-than-human world, and hence of what constitutes or defines the human' (2018, p.4).

In this context, my archival research with John's letters has shown that her life-long relationship with her cats, challenges stereotypical understandings of 'the woman and her cat' (see Jones, 2005), but also adds intense corporeal and visceral forces in the portrait of an artist who has been mostly presented as an ethereal creature devoted to the spirit of her art and to her conversion to the Catholic faith, as a result of her attachment to Rodin (see Foster, 1999). John and her cats or rather the cats and their John create an *assemblage* of human and non-human bodies, enacting material, embodied and enfleshed forces that matter in our understanding of modernist women artists and the socio-cultural contexts within which they lived and worked.[7] It goes without saying that the paper draws on lines of a burgeoning literature in the area of critical animal studies, but given its limitations it does not engage in the hot debates within this field.[8]

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[7] For a rich discussion between embodiment and enfleshment, see Huzar 2021.

[8] For a recent overview of this field, from a posthumanist perspective, see Cudworth and Hobden, 2018. Dona Haraway's work has been foundational in this field and her disagreement with Deleuze and Guattari's notion of *becoming animal* is well known (see Haraway 2009, 27-30).

Cats as Companions and as Epistolary Signs

'Eily sent me a letter—I must answer it—she said she admires me because I have two aims, a life with two aims or something like that. What are they? Does she mean the cat for one?'[9] In the letter above, written to Tyrwhitt on July 12th, 1908, John was reflecting on the message of a letter she had received from their mutual friend and former fellow student at the Slade, Elinor Mary Monsell.[10] If there were two aims in her life— and painting was surely one of them—her love for cats was the second best she could think of. Notwithstanding the humorous irony of this epistolary line, cats became for John a saturating and catalytic presence in her life and a constant theme of her letters to her friends, lover, patron and acquaintances.

Exchanging news about her cat would often sustain the sequence of correspondences or resume broken lines of communication. When Dorelia McNeil—John's companion during a walking tour in France in the autumn of 1904—left Paris to follow a lover in Belgium, the first message she sent after a long silence was a postcard from Bruges with a one-line message: 'How is the cat?' (Chitty, 1984, p.66) Later in the same year, when McNeil wrote again to say that she was expecting a baby, John's response was that her own *ménage* news was rather gloomy since 'the cat's kitten had got ill and died.'[11]

There is a constant juxtaposition in John's letters between the care and love for cats and children, that sometimes creates tensions and misunderstandings as recounted in the following undated letter to Julie, written on a Thursday night between 1906 and 1907:

> My concierge has sent her child to the country and she has become sad and silent. I told her: "Oh, I understand why you are worried—I would be the same if I were separated from my little cat! She seemed a bit offended as if she considered her child to be superior to my little cat! As for me I don't see any superiority in her child. My little cat is so good and sensible. She is never naughty! Or very rarely and then this shows that she is afraid of somebody.

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[9] NLW MS 21468D, f.24.

[10] See Lloyd-Morgan, 2004: 45.

[11] Lloyd-Morgan, 2004, p.36.

> Sometimes she is stubborn and in a rage, but I like better a cat that puts herself in a rage instead of screaming in a sorrowful way as cats do in general … Excuse me Julie, if I talk so much about my cat, but for me she is more important than a person.[12]

Not only is her cat equally important and maybe better behaved than a child, she is also quite a character and obviously better than other cats. As already discussed, John firmly thought that animals in general and cats in particular were as differentiated as humans. As put in another undated letter to Julie written on a Thursday afternoon:

> Are all humans, humans and all animals, animals? I think that some people are other things than humans and some animals are other things than animals. My little cat is half tiger and half little girl. But sometimes she seems to me older … But I know that people find in nature clear-cut lines.[13]

Clearly, the boundaries between species and the nature of species as categories are contestable and John and her cat(s) are constituted in terms of social relations that Donna Haraway (2003) has theorized as 'significant otherness.' John seems to be aware of the audacity of such a position and is sometimes ambivalent about it, but also grateful to her friends for accepting it. As put in a letter to Tyrwhitt, written on June 1st, 1908:

> You are always proving how wonderful you are, a fact which you knew already, why will you insist upon it? The last unnecessary demonstration is the mention or mentions of my *petite chatte*. Yes, I see you know, she is very, very, important, perhaps the most important thing—but that ought not to be, *n'est-ce pas?*[14]

While expressing her ambivalence about her friend's approval of her passionate attachment to her cats, John seems to go beyond the notion of 'significant others', projecting Rosi Braidotti's idea that 'the animal can no longer be metaphorized as other, but needs to be taken on its own terms', within the wider realm of 'the neovitalist

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[12] MR/MGJ/B.J4, letters to Julie, undated, non-localizable.

[13] MR/MGJ/B.J4, letters to Julie, undated, non-localizable.

[14] NLW 21468D, f.21a.

immanence of life' (2009, p.528) In this context it is no wonder that cats become constant companions in John's life and are consequently very much included in her epistolary cartographies of the city, a theme that I will discuss next.

Real and Imagined Spaces, Human and Non-Human Animals

As her correspondence reveals, John was always on the move, while living and working in Paris, between her room and the 'outside'—the Parisian, streets, gardens and the surrounding countryside. The detailed way in which her letters describe interior spaces and particularly the anxiety of finding a room, usually involves a reference to her cats: 'I will never find such nice wallpaper … Also in a different room there will not be a courtyard for my cat to run and people will cause problems about the cat maybe because the concierges don't like having cats in the houses.'[15]

John's cats are cherished companions when she stays in her room: they keep her company when she paints, reads or writes letters and sometimes their bodily traces are included in the *assemblage* of the epistolary materiality: 'I wrote to you some time ago but the letter was left on the table and is now covered with Edgar Quinet's footmarks. I have just been singing "Alice Ben Bolt" but Edgar Quinet does not like it and bites my chin.'[16]

Sometimes, John is compelled to remain indoors and paint the cat, even though she had planned a trip out: 'I drew my little cat today … I read a lot and at the end of the day when I was planning to get the air the cat took so many nice poses and was so tranquil that I started drawing.'[17] But the cat also becomes John's companion during her walking expeditions in the Parisian boulevards and gardens or the surrounding countryside:

> This morning I woke up at seven o'clock and went on the boat. My Master has told me not to take my little cat in the country again. But I believed that if I attached her on a lead it would not be the same thing … I got off at the station before Surennes and walked at the riverside till I found a place with

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[15] MR/MGJ/B.J4, letters to Julie.

[16] Letter to McNeil written in Spring 1906, Lloyd-Morgan 2004, 39.

[17] MR/MGJ/B.J4, letters to Julie.

shadow by the river … The cat was running in the forest but always attached

by the string. There was nobody there and we were happy … [18]

Being in the countryside in the company of her cat is depicted as a state of happiness par excellence in John's letters. This is a precarious happiness however, often disturbed by the presence of intruders as the letter above goes on recounting:

… From time to time a man would hang around me and sometimes begin a conversation. I wasn't afraid because the street was very near and there were always people there and I didn't have to do anything else but go towards the street so that the man could see that I didn't want to have a conversation. Once a man told me 'Oh, I would like to be the cat of a Miss like you!'[19]

John has written many detailed letters about experiences of harassment while moving out and about. Her letters recounting her adventures of searching for her cat that went missing in the Meudon countryside for about a month in the summer of 1906 and then again in 1907 are however quite astonishing, unfolding extravagant narratives, as I will further discuss.

Narratives of becoming-cat

I am now a little savage myself and yesterday I was brown everywhere like a girl of the woods because I have been naked in the sun many times, since as I have told you, nobody enters here … I think I should live like a savage girl in the forest, maybe for two months! I am under a small tree, which is covered by a climbing plant, making a kind of roof. I have many things here, shawls as coats for the nights, writing material, etc. I feel like Robinson Crusoe.[20]

Written from a hideaway in a wooded area of Meudon the letter above paints a dramatic picture of a single woman looking for her lost cat in the semi- wilderness of

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[18] MR/MGJ/B.J4, letters to Julie.

[19] MR/MGJ/B.J4, letters to Julie.

[20] MR/MGJ/B.J4, letters to Julie.

the countryside surrounding Paris. John's adventures of desperately searching for her cat have been recounted in detail in the many letters she wrote to Rodin and her friends in the UK. The cat would usually and repetitively go missing particularly during the summer months and John would spend days and nights looking for her. During these extended periods, she would undergo a lot of harassment and bullying, particularly when she was out at night:

> But men were following me and I was afraid to be seen in the street alone and also I did not want to move away from the cat. I was walking for protection very near a man and a woman and the men who had been following me went ahead and when they turned round a corner I went back running very quickly and I hid myself in the dark side of the street that went straight up. There I waited for many hours till all footsteps had stopped and sometimes it seemed to me that I could hear my little cat, not very far from me, near the houses where she had disappeared. I was very unhappy, I was hungry and cold.[21]

Apart from the bleak picture of 'an odd' woman desperately looking for her cat in the dark streets of a little provincial town, the letters about the lost cat unfold many interesting themes around gendered spaces, solitude, fear and human communication. Moreover, boundaries between humans and non-humans are blurred, while unconscious projections emerge in the way the love for the master is interwoven with the love for the cat in the order of the epistolary discourse:

> Two ideas are fixed in my mind … First that my little cat has died from hunger, and the other that I have lost the love of my Master … I believe that he will not love me anymore, not only because I have not looked after my little animal, but also because I will be bored and troubled without my cat and for this I won't be beautiful any more and I won't welcome his visits in my house very often …[22]

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[21] MR/MGJ/B.J4, letters to Julie.

[22] MR/MGJ/B.J4, letters to Julie.

The causalities drawn in the above letter are indeed inconsequential and disjointed. However, they release strong affective forces that create a *plane of consistency* which I wish to map following lines of *becoming-animal* in Deleuze and Guattari's analytics: 'we believe in the existence of very special becomings-animal traversing human beings and sweeping them away.' (1988, p.237)

In taking up the rhizomatic thought of *becoming-animal*, Deleuze and Guattari are very careful to make clear that becoming in their analytics 'is not a correspondence between relations [nor is it] a resemblance, an imitation or identification.' (p.237) Becomings should be conceived within 'the Bergsonian idea of very different "durations," superior or inferior to "ours", all of them in communication.' (p.238) In this sense, the relationship between John and her cat (s) should be charted as a complicated cartography: it is not about John becoming like a cat, neither can her cat be projected as an animal with human properties and characteristics. What is traced in John's letters is her experimentation with what a woman's body can do when released free to be affected by the love of her companion—a non-human animal. As Deleuze and Guattari note, 'starting from the subject one is … becoming is to extract particles between which one establishes the relations of movement and rest, speed and slowness that are *closest* to what one is becoming, and through which one becomes.' (p.272) In this light, John's eagerness to experience the cat's world is an expression of her fear and anxiety about what was happening to her beloved companion, but also a will to be closer to her through entering different spatial and temporal rhythms:

> I believed that the cat was in the wild territory behind the houses of the road to Moulneaise. … There is a territory so sad between these houses and the river … There are big holes and heaps of garbage and all the plants smell badly and there are rats and frogs that make little noises at night. I have passed many nights there and in the small avenues and streets near the downside of Meudon-waiting for the cries of the cats.[23]

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[23] MR/MGJ/B.J4, letters to Julie.

In looking for her cat in the semi-wilderness of the Meudon countryside vividly depicted in the above extract, John makes connections with the cats' habitat and thus enters the cycle of living like a cat. By being naked in the sun, she 'gradually extracts from each body a set of affects: ways in which the body can connect with itself and the world.' (Massumi, 1993, p.93) According to the letter in the beginning of this section, she becomes 'a nymph in the forest', that is neither a woman, nor a cat but a semi-monstrous figure, a combination of bodily affects, virtual forces and mythological images and names. In bringing together two *molarities*—a woman and a cat—John 'actualizes a selective combination of them' (p.93) on the conscious level of being away from people, sleeping out at night. In doing this, unconscious fears and threatening familial figures are also surfacing, 'childhood family memories pour in' (p.94); they become recognizable and thus enter the narrative prose of the epistolary discourse:

> I am still in this plantation. The silence oppresses me … However, I feel more at home here than in the world. These trees and insects are my friends. When I hear human voices from time to time, I feel worried. I am afraid of people right now. However I have to go into the world to work … But I am attached to nature because like a spoilt child I fear my father and I search for a refuge close to my mother![24]

John's escape in the wilderness while looking for her cat is not 'rational', but can be read as a desire to escape bodily and cultural limitations. As Brian Massumi pithily notes, 'what matters is that the constraint is there, and that there is a counterdesire to leave it behind' (p.94), a force that leaves its traces in the epistolary narrative while rendering it excessive, deviant and hard to follow.

The *event* of the cat getting lost irrupts into the domestic calmness of the content *molar* woman in the tranquility of her room, enjoying the 'sweet patience of the cat that even when disturbed always returns in my arms making ronron.'[25] This *event* then sets in motion a series of *events* that *deterritorialize* both the woman and the cat and release forces of *becoming other*. 'Becoming in its simplest expression' notes

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[24] MR/MGJ/B.J4, letters to Julie.

[25] MR/MGJ/B.J4, letters to Julie.

Massumi (94) 'is a tension between modes of desire plotting a vector of transformation between two *molar* coordinates'—the domestic woman and the cat as a pet, an oedipal animal. But something happens—the cat gets lost—and both the woman and the cat enter a space/time *assemblage* that forces 'each contained and self-satisfied identity to be grasped outside its habitual pattern of action, from the point of view of its potential, as what it is not, and has never been, than what it has come to be.' (95) In this light, John does not become a cat, but she is affectively redefined and forced to rethink the constraints that condition her mode of being in the world. As Deleuze and Guattari note, 'there is a reality of becoming-animal, even though one does not in reality become animal.' (1988, p. 273)

Whilst living in the plantation however, John has to return to the world, to work, clean herself, find a hairdresser to have her hair done, sleep in her bed and even be with her lover. But she always returns to the plantation till her cat is eventually found. There is a repetitive rhythm of going and coming back, a fort/da movement unfolding in the narratives of her letters:[26]

> I slept in my room in Paris this afternoon and drank some hot milk with rhum as I have caught a cold and I have a terrible fear that I will be incapable of continuing to search for my cat.
>
> I have come here this morning after having my hair done at a hair-dressers … I had neglected it a lot … but now it is very nice and even a bit shining …
>
> I have brought something so that I can write here [the forest of St Cloud] because now the restaurant makes me feel sick, it is so dirty and filled with bad smells. I have come back here soon after I have posed and I have called for and waited for my cat, but she has not appeared yet …
>
> … it seems to me that I cannot continue the search without being now with you for some time. I have not lost hope but I am very tired, since I haven't got any chance to rest for a long time …

These repetitive movements are not necessarily effects of conscious, target-oriented decisions or willful acts. 'Becoming is directional rather than intentional' notes

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[26] MR/MGJ/B.J4, letters to Julie.

Massumi (1993: 95) and 'the direction it moves in may appear unmotivated, 'irrational' or arbitrary from the point of view of *molarity*', which is usually the perspective John's letters have been read from and interpreted.

In moving in-between different spaces and rhythms, rural and urban milieus and 'civilized' or 'savage' states, John extends and expands her body's repertory of responses, experiments with unthought-of possibilities of what a body can do: she dares risk good and/or bad encounters. As Massumi points out, 'becoming is always marginal, a simultaneous coming and going in a borderland zone between modes of action.' (1993, p. 106) John's letters thus leave traces of an increasing complication in how she makes sense of herself and the world around her, responding to an event that has created a rupture in her life—the loss of her beloved cat. By roaming in the semi-wild habitat of the cat, her body's degrees of freedom are inevitably increased and new sensations gradually become part of her lived experiences:

> Now the night is about to come. The sky is calm after the storm. Everything is beautiful. I love to think of my Master and I would be totally happy if it were not for the thought of my little cat being perhaps unhappy or sick … In a while the night will fall with all the sounds that I now know so well. Soon the song of the toads will start around me. Two notes that recall the flute and harmony. It's the moan for love of the toads and the nocturnal whisper of the leaves like the rustle of a train. A dog will lament in the neighbouring farm; the train is about to pass … I put my lips on this paper to tell you goodnight.[27]

The nocturnal sounds of the country and the city are mingled in John's experience of sleeping out while looking for her cat; feelings of happiness and anxiety are blurred, and new sensory modes emerge as the sounds of the night create a specific plane of sensibility that bring John closer to non-human animals and the habitat of her cat. By sleeping out, John leaves her body exposed to affect and to be affected and unleashes its capacity to act and to perceive. 'We do not become animal without a fascination for the pack, for multiplicity … for the outside' Deleuze and Guattari note (1988, p. 240). Dona Haraway has taken issue with the notion of 'the pack' in Deleuze and Guattari's

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[27] MR/MGJ/B.J4, letters to Julie.

idea of *becoming animal*, arguing against their abstract thought that leaves no ground for understanding and indeed engaging with real living animals:

> D&G express horror at the "individuated animals, family pets, sentimental Oedipal animals each with its own petty history" who invite only regression. All worthy animals are a pack; all the rest are either pets of the bourgeoisie or state animals symbolizing some kind of divine myth All worthy animals are a pack; all the rest are either pets of the bourgeoisie or state animals symbolizing some kind of divine myth. The pack, or pure-affect animals, are intensive, not extensive, molecular and exceptional, not petty and molar—sublime wolf packs, in short. I don't think it needs comment that we will learn nothing about actual wolves in all this. (Haraway, 2009, p.29)

While I agree with Haraway about the abstractness of Deleuze and Guattari's philosophy, I don't see it as an impediment in deploying their idea of *becoming animal* as a pathway to understand intraspecies relations.[28] Here I align with Braidotti's pithy observation that 'de-oedipalizing the relation to animals is a form of estrangement that entails a radical repositioning by the subject'. (2009, p.526) Braidotti sees the process of *becoming animal* at the heart of the posthumanist turn, a materialist approach that posits 'a shift away from speciesism and toward an ethical appreciation of what bodies (human, animal, other) can do. (p.528) What I therefore see, while reading John's cat letters is that the experience of 'the pack'—grounded as the cats' world at night— transposes not just John but also the oedipalized image of 'her little cat', which can now be re-imagined in a different non-human world and outside human relations, taboos and regulations:

> I am still searching and my sweet little outcasts were so hungry last night. Now the moon is full, I am going to be out all night before the moon wanes and when the cats make love I run to see if my sweet is one of them (and there are always many overlookers beside the lovers).[29]

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[28] A more in depth engagement with this debate goes well beyond the scope of this paper, which unfolds on the plane of Deleuze and Guattari's analytics from a narratological angle.

[29] Letter to Tyrwhitt, NLW MS 21468D, ff. 23-4.

It is by being fascinated, dazzled with the world of nature, the outside, that John experiences a rupture in the grid of identities and subject positions that have overcoded who she is and what her body can do; she thus enters a process of *becoming-other*, opening up new paths, inventing new trajectories, following *lines of flight*. Becoming in this sense is *involutionary*—evolution between heterogeneous terms—a creative process not to be confused with regression, as Deleuze and Guattari point out. (1988, p.238)

John's *lines of flight* would be *reterritorialized* at some point and her becomings would be redirected, since the Law of the Father would eventually impose order. On some occasions the cat would be lost for ever, on others, Rodin's intervention would help her find the cat, as reported in the following letter written on Sunday, July 7th, 1906:

> My little cat was found. It was myself who found her but it was through your letter. M. Sauvageux read your letter in front of everybody and people would search and come and talk to me about all the cats they had seen and a man had seen a cat which was very similar. We searched for it with a dog for the whole afternoon, but we couldn't see it and then I waited outside at night and at five o'clock this morning I saw her. I am obliged, it was the first time that I was outside after you had advised me against it and the weather was nice.[30]

Rodin's letter ended the drama in 1906, although the cat went missing the following year as well. Thus although *reterritorialized* within *striated spaces* and *molar* identities, both the woman and the cat would keep following *lines of flight*: the experience of roaming in the wild had already effectuated transpositions and mutations that could not possibly be annihilated by the return of the same. Becomings 'can only proliferate with carefully formulated group strategies', Massumi has noted, (1993, p.102) if they are not to re-enter overcoded *molarities*. Still what happened in the in-between, the *intermezzo* of *becoming-cat* is catalytic in the radicalization of the future, the possibility of re-imagining female subjectivities, then and now. Although the cat was found in 1906, this would not become a happy end: stability would never impose its *molar* order on John's life and she would go on roaming with or without her cats till

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[30] MR/MGJ/B.J5, dated letters.

the very end of her recorded life when she became *imperceptible* somehow, somewhere in Dieppe.[31]

The *event* of a lost cat would thus initiate a series of *events* and *becomings*, since what is important to remember here is that there is always a third space between the *striated* spaces of patriarchy and the *smooth* spaces of the female nomad: *the holey space* in Deleuze and Guattari's analytics 'and the way it communicates with the *smooth* and the *striated* in different ways.' (1988, p.500) But what is the function of this *holey space*? As its etymology indicates, it 'hollows out' (Frichot, 2007, p.175) transient spaces, hanging in the *intermezzo*. In this light, the semi-wilderness of the plantation that sheltered a woman at night would become a *holey space* for the unfolding of tactics and affective forces. As John's biographer notes following her letters, in waiting for her cat in the plantation John would actually adopt her cat's body-space rhythms: 'like a cat, she could be still … sometimes she a spent a whole hour watching the activities of ants.' (Chitty, 1981, p.107)

The somehow dreary situation of the plantation where John would sleep at night while searching for her cat, also brings to mind Massumi's reconfiguration of *the holey space* as *the derelict space:* 'holes in habit, what cracks in the existing order appear to be from the *molar* perspective.' (1993, p.104) John's spatial experience of the plantation seems to emerge within the cracks and interstices of the *molar* perspective: she is a *minoritarian* figure, an odd woman sleeping out in the plantation while searching for her cat; but the villagers had given her a kind of bed and the plantation would become a relatively safe hideaway that would keep her close to her beloved companion. As she wrote to Rodin in July 1906:

> Don't worry that I will be cold at night; yes I will sleep out, but in a bed. Do you know the planks that separate the wild part of your field from another wild field where there are many trees? This is where my cat was seen and where I sleep … There is a village woman there with her husband and her little child, they live alone and nobody can enter. Yesterday evening she

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made a bed for me, she put a mattress on a bench and sheets and a pillow and many blankets.[32]

But while being in the interstices of the semi-wilderness of the Meudon fields and a homely bed temporarily prepared for her, something really cracks in John's rhythms of the perceived spaces of modernity. New possibilities seem to emerge in the *derelict spaces* of the Meudon countryside, since the *derelict space* according to Masumi 'is a zone of indeterminacy that bodies-in-becoming may make their own.' (1993, p.104)

There is a conceptual proximity here between spatial configurations within *holey/derelict* spaces in DeleuzoGuattarian analytics and the Foucauldian *heterotopic* relations of John's spatiality. Charted in the peripheries of dominant hegemonic spaces these 'different spaces' allow *molecular* tactics to be deployed and create conditions of possibility for autonomous zones that are 'intersitial, they inhabit the in-between of socially significant constellations, they are where bodies in the world but between identities go: liminal sites of syncretic unorthodoxy.' (Massumi, 1993, p.105) The *holey space* as a tent for the nomad in Deleuze and Guattari's analytics (1988, p.413) or as an autonomous zone in Massumi's redeployment of the notion as the *derelict space* (1993, p.105) constitutes a plane wherein John's becomings, her real and imaginary adventures, can be mapped within and beyond the *event* of the lost cat.

Becoming-cat, Becoming-other

In theorizing desire as movement, 'a method of doing things, of getting places … a mode of connection and communication' Elspeth Probyn (1996, p.41) has considered her unique relation with and love for horses connecting it to a love for freedom, 'a desire to become other.' (p.39) But what connections could be traced in the line of becoming-cat? As Thom Sullivan (2009) has pointed out there is a definite line connecting philosophers and cats that goes through Montaignes, Derrida and Cixous:

> Catching sight of their cat looking at them interrupts the philosophers, even puts them off their train of thought. Moved to write about this unsettling feeling of being watched attentively by an animal, they reflect upon an

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[32] MR/MGJ/B.J5, dated letters.

awareness of being in the perceptual world of another creature, and what this might mean. (Sullivan, 2009, p.1)

Sullivan's eloquent discussion of the philosophers' relationship to their cat is particularly attentive to Cixous' dilemma of protecting the life of her cat by restricting her freedom: 'I do not want to open the doorway to death. Yet it is I who bring death into your life! Ah, my love, how can I help wanting all that you want? How can I want all that you want? How can I want against your wishes?' (Cixous in Sullivan, 2009, p. 2) The cat becomes an event in the philosopher's life notes Sullivan, disrupting its spatio-temporal rhythms and raising ethical demands of being looked after and protected.[33]

John's response to the loss of her cat seems to follow the ethics of responsibility that Haraway (2003) has raised vis-à-vis companion animals but also Guattari (1995) has flagged up in relation to the planet, the possibility of a future *cosmos.* Drawing on Spinoza's affirmative ethics, Braidotti has also highlighted the ethical dimensions of Deleuze and Guattari's notion of *becoming* animal: 'Spinoza's lesson is crucial for Deleuze and Guattari's ethical project. The selection of the affective forces that propel the process of becoming animal or minoritarian is regulated by an ethics of joy and affirmation that transforms negative into positive passions' (2009, p.530). John has followed this ethical *line of flight*, which has ultimately *deterritorialize*d her from patriarchal segmentarities but has also created excessive and hyperbolic possibilities of what a woman's body can do. In following traces of her lost cat, John has transgressed boundaries of *striated* spaces and has wandered in tracks of *smooth* spaces, *becoming-cat, becoming other*. Her unpublished poem[34] below about her lost cat has frozen some forceful moments of such *becomings* and the responsibility of looking after her cat has become a promise to wait for her return:

Oh my little cat

Savage in the woods

Have you then forgotten

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[33] For an overview of philosophical engagements with cats, see Gray, 2020.

[34] MR/MGJ.

Your life of other times?

Maybe you are

Crossed with me

But I have tried to understand

Your little heart

I have never become aware of

Your superior

Little mysterious soul

In the body of a cat!

I have had so much pain

Not to have seen you

That I have thought of going

To the country of the dead

But I will be here

If you return one day

Because I have been strengthened

By the god of Love

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Synaesthesia

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Synaesthesia: to experience a sense in the modality of one or several others

Abstract

The following entry includes firstly a list of synaesthetic portals, and secondly an initial table of scaled sensory modalities following Felicity Colman's 'Fragment of a Modalities Map' (Colman, 2019, p. 985-987). James Joyce famously begins his 'Proteus' chapter of *Ulysses* with Stephen Dedalus describing the 'ineluctable modality of the visible' (Joyce, 1922, p. 37). Synaesthesia presents a phenomenon whereby the modality is not merely ineluctible but is also a portal that can potentially link one sensory realm to another, suggesting an infrastructural connectivity that links ostensibly individuated or hermetically differentiated perceptual fields. To describe this process as merely the condition of synaptic short-circuitry affecting a small percentage of human animals does not account for the ways in which synaesthesia is always already at play in all the regular sensory categories, in its experience as and between what analytic philosophers call 'qualia', neither does it account for also the ways it can be played as if it were an instrument itself. Perception in general can be perceived as an organ within itself: a desiring organ, as Vicki Kirby says in *Quantum Anthropologies* (2011, p. 120).

Keywords

Sense; sensory; modality; perception; organ

Synaesthetic Portals

If we continue to think of perception as a desiring organ, then, how would it desire? Let me count (some of) the ways.

optical-auditory the sound of dust falling in the light. It falls in streams as if a prism is resting there and all along the banks a hymn is sounding. The tone of a summer afternoon is between clarinet and oboe. How else? The honeyed yellow haze, afternoon of the faun, the slumber and the dream of prancing legs and love amongst grass and flower. To scale and balance with seasons and times we could. The cloudless night: the light bare and headache glare of snow on pine-flanked frosted path. Whose woods these are. The crunch of boots in whiteness and the swirl of purple and red. Bruised hearts between the ears. How can headphones make this. The heart is bruised, the pitch-bend moves. Narcotic bloodletting sickness under the pale moon. My bloody valentine.

optical-olfactory when a scent is the scent of a scent. The absolute blooming of a bloom. The reddest of reds. Tied tight and deep in the colour. Never is this knot seen, a knot in the word and look what bursts forth. A haze, within which to be suffused, as when a scent is diffused. A rose by any other shape would smell as sweet and ripen then transform. Diamond petals fall like rain to form a sea of diamond waves. Bravely sails the folded paper-napkin boat upon this scented sea.

optical-tactile all sensitive hairs touch with their eyes: tendrils, tentacles, antennae, each bristle of the brush. Periscopes in love are twisting beams or vines of light with eyes on strings that stretch and tend towards the thing they love. When they meet they twist and thread together making bracelets to twist around the arms of those who love, lovers as those who also see with fingers, then fingers too have eyes that stretch and tend towards the thing they love, and so, and so, ad infinitum. Triadic structures twist and plait to form a golden braid that tumbles from the highest window of the tower. Towers, too, of course, have eyes. Panhapticon.

optical-gustatory when it is about to thunder – a bruise across the sky but also lead pipes lying against the roof of the mouth. The anticipation of a shock is felt as metal. A translucent

taste has only silent notes and overlays, harmonic flavours, lilac with sawdust, geranium with mildew. The way the light catches the green bottle makes five layers of overtones: fresh/mystery/race/wail/lawn.

auditory-gustatory echoes and shadows of tastes and scents. To move from state to taste, it's there in the mastication of the matter. Time slows down when honey is hardened and holding grains together. Nothing is heard outside the crunch inside the internal cavern. Not a correlate of density. The lightest note carried on a phantom wind is stronger than the saturated slab that thuds the ground.

auditory-tactile rough splintered sticks stuck in sludgy soupy mire or honey. The grain of the voice that grates, a voice only sounds when it goes against the grain of itself. These rusty shards to penetrate, little knives and needles, offcuts, shards of a spectrum. A splinter is what you feel, not of wood but of glass. The sound of roughness can be scaled and the units are extremely small. A composite sound with fibres inside, rough to touch but very strong. Polish up, add lacquer to make this surface all one silent glide. The pores are singing.

auditory-olfactory If we call a rose a rose, in the smound we are called by its note. Redness in the nose. Scales upon them and nostrils encrusted with jewels. Reeded holes that whistle when the air blows through. But inside the nostrils' double tunnels a symphony is playing. Add a drop of liquid, a tack in the aperture, the hole winks open and closed, wetly. Clicks that do not express but do betray a moisture. Listen, the pipes need cleaning. The smell is not separated from the honey of its lining: these chambers are wooden, streaked with amber. Blow your nose: a sepia note.

tactile-olfactory and if it were resting there, transcentent, what then? The cool hard edges lend themselves to forbidden scents of glass and metal. Scents that should not be there and for which we have no name. It omits what you permit it. So permit it. Put your nostrils close and out will puff a cloud, a scent of violet disturbs the senses, the object wants to make you love it. The cloud is a bloom as when algae becomes exponential. The tendrils of the creature logarithmically recoil just as the diminishing return of the spiralled dome in which it rests. The sheen of slime that hides the scent before it hardens to varnish.

olfactory-gustatory conjoined and sharing a brain. The wires are already crossed. A bite is always a more than a double articulation. The morsel is felt in all the chambers, but most elegantly in the brain. And what of this spongelike matter, grey and white jelly mulch, tough to chew but rewardingly metallic. Your stem is a delicate bird with a long straight tail such as that of a swallow. To taste the same genus as yourself is still a nourishing tautology.

tactile-gustatory when tongues are tendrils and tendrils are tongues. Licked by a jellyfish, one thousand lashes. The papillae are stinging. When faint tide mark of sea salt powdering the post-paddled lower human limb attracts the pink and spiny wriggling slice that lies inside the mouth of the cat. A fizzing magic potion of citric acid and sodium bicarbonate and saliva, mix and swirl to white fizzing lava through the rolling hills and grasses of the human tongue. Blistering lemon sherbet moon craters.

Table 1: Sensory Modalities

Sensory system	Organ	Symbol(s)	Greco / Roman word	Deities / mythological figures	Poetic or religious connotations	Philosophers / writers	Scales / spectra / unit quanta
Visual / Optic	Eye, pineal gland	Eye of Horus / Irt Oudjat Ojo de Dios Eye of Providence The Evil Eye Nazar Boncuk Third Eye / Jnana Chaksus	μάτι, oculus	Dogu, St. Lucy / Lucifer	Window to the soul, symbolic or inner visión, intuition, third eye / brow chakra	René Descartes, Democritus	Visual field, light, chromatic spectrum, vibrations
Auditory / Aural	Ear	Whorl / spiral, *shankha*	αυτί, auris	Kama, Santo Ovídio	Shell, vulva, fertility, inquisitiveness, memory, theosophy, the sun	H.P. Blavatsky, Gerard Manley Hopkins	Frequency, amplitude, scales, vibrations
Olfactory	Nose, olfactory bulb, Jacobson's Organ	Discernment / discretion, phallus	μύτη, nasus	Yacatecuhtli	Saint Anthony of Padua, detection of hazard or falsity, caricature	Salman Rushdie, Nikolai Gogol, Lyall Watson	Inelastic electron tunnelling / vibrational theory of olfaction, scent molecules
Gustatory	Tongue	Phallus, serpent, language	ιλώσσα, lingua	Kali	Mémoire involontaire, glossolalia, divine language, restraining the tongue in Ramadan	Thomas Tomkis, Marcel Proust	Food molecules, papillae, olfactory system

Tactile / Haptic	Skin, interstitium	Boundary, identity, communication, feeling	δέρμα, pellis	Xipe Totec	Mark/tattoos/signs of possession/holiness; reptilian shedding of skin, Job's wounds	Democritus Maurice Merleau-Ponty, Didier Anzieu, Steven Connor	Surface-skin mehcanoreceptors, wavelengths

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Versions of Phenomena

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This text seeks to rethink the concept of the 'phenomenon' through a diffractive reading of Karen Barad's posthuman theory of performativity: agential realism (Barad, 2007) with my own studies in education (Sauzet, 2021a). The concept of 'phenomenon' comes from the Greek phainómenon, meaning 'that which appears or is seen', and has been the subject of a wide array of writings. I will now briefly introduce a few key-thinkers on the matter, to contextualize how a posthuman approach might differ.

Traditionally, philosophical writings on phenomena are occupied with exploring human experiences, and how these are reflective, mediating, or a part, of phenomena. Immanuel Kant, following Aristotle, conceived of phenomena as denoting that which is experienced empirically by the senses through reflections (Kant, 1770, p. 14). Kant distinguished phenomena from noumena ('things-in-themselves'), separating *experiences* of, from the *reality* of, the observed, (or epistemology from ontology) (Wilke, 2013). Edmund Husserl later espoused phenomenology as: "*a descriptive theory of the essence of pure transcendental experiences from the phenomenological standpoint.*" (Husserl, 1964, p. 209). Martin Heidegger later insisted that phenomenology was a fundamental ontology, that hinged on our *being-in-the-world* ('da-sein') (Heidegger, 1926), and so moved beyond Husserlian and Kantian questions of reflections between objects and subjects, espousing rather that object and subject were inseparable (Horrigan-Kelly, et. al., 2016).[1] Broadly speaking, phenomenological approaches come together in addressing the problems of appearance (Sokolowski,

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[1] Phenomenology has been developed further still in various directions as existential phenomenology (Jean-Paul Sartre) the phenomenology of the body (Maurice Merleau-Ponty) (Speigelberg & Biemel, 2017).

2000), and in describing phenomena as experiences of the real or way the world comes into being (Merleau-Ponty, 2012).[2]

In contrast, posthuman theorizing of phenomena rethinks the subject through a decentering of human exceptionalism, defined by an exploration of agency as distributed through a flattened ontology (Alaimo & Hekman, 2008). Particularly interesting here (and the focus of this paper) is Karen Barad's 'agential realism', in which Barad reads the work of Michel Foucault, Judith Butler, Donna Haraway and Niels Bohr diffractively through one-another in proposing a "relational ontology" (Barad, 2007, p. 130). In agential realism, phenomena are considered as ontological and epistemological entanglements, rather than as separate entities, existing on different planes of existence, whose relationality hinges on human mediation or reflection. And crucially, phenomena are not reproducible, but differentially repeatable. That is: "what matters is not the exact reproduction of the same sequence of events, but the reproduction of a significant pattern despite various differences among instances of the same phenomenon." (Rouse, 2004, p. 143). In this text I draw on agential realism to unfold a post-human consideration of, and analytical strategy for, momentarily stabilizing different versions of the same phenomenon through empirical studies. In doing so, I want to suggest that exploring co-existing versions of a phenomenon, allows for performances of iteration and difference within a phenomenon, as it emerges through time and space. I argue that this approach affords an enactment of the unheeded effects of, and tensions within, phenomena.

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Below are fragments of participant observations from 3 different situations, in 3 different schools in Denmark, where I undertook fieldwork from 2017-2019. The fragments concern how social educators[3]' practices in primary and lower-secondary

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[2] Other traditions, like phenomenalism, are occupied with experiences of phenomena which are thought to be the-thing-in-itself (Fissel, 2012). And phenomenography, which explores the: "qualitatively different ways in which people experience, conceptualize, perceive, and understand various aspects of, and various phenomena in the world around them" (Marton, 1986, p. 31).

[3] Social educators are a professional group who work in institutions for children, youth and adults, including: daycares, pre-schools, schools, after-school facilities, special needs institutions, palliative care and with marginalized groups. Their core primary areas of activity are development and care, connected to pedagogical work. Following an extensive reform of the Danish primary and lower secondary schools (2014), social educators became a part of the staff in schools. Before

schools are made possible through different time-space organizings of subjectpositions for them in schools. But the fragments are also examples of a post-human empirical exploration of situations through which different versions of the same phenomenon – social educators in schools – will be performed.

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Version 1: Second period.

*The social educator **sits on the table** placed on one **side of the classroom, swinging** her legs back and forth. She is **looking** at the **teacher by the blackboard** who is **instructing** the pupils on the **content** of today's lesson. The room is quiet, there is a **concentrated** and **attentive** atmosphere.*

…

Version 2: First period.

*The social educator **stands by the blackboard**, and tries **calming the children down**, asking them to **listen** for a **minute**, so that **she can go through the content** for today. The room is **small**. The children's **stools** almost touch one another, as heavy backpacks dangle from the stools.*

…

Version 3: First period.

*The social educator is **slouched** into the **chair**, his **feet** are placed **on the desk** and his **hands are folded behind his head**. The **children sit on their desks**, or walk around, some are **tickling each-other**, some are **talking to each-other**. The social educator **asks the children** if they know **what they are supposed to do today**. The children reply that **they do not know**, and that they **would prefer doing nothing**.*

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the reform they were mainly employed in after-school centers. Following the reform, they could be employed as co-teachers, and, to a lesser extent, teach in the first 4 years of primary school. Following the reform, the number of social educators with tasks in school more than quadrupled. This article draws on fieldwork from 3 different schools, where I followed social educators work lives in schools, which was a new organizational and institutional setting for them (Sauzet, 2019).

Phenomena

Agential realism is a post-human theory of performativity, and it is part of what has been called a post-human turn in the humanities and social sciences, which attempts to establish matter and the non-human as active agents in social science analyses, whilst questioning the very material-discursive boundary-making practices that enact 'human' and 'non-humanness' (Barad, 2007, pp. 92-93). From an agential realist stance, the smallest object of analysis is the phenomenon. The phenomenon is defined as the intra-action of the measuring agencies and the object of analysis, and both are considered emergent from, rather than preceding, this intra-action (Barad, 2007, p. 128). Attuning empirical research to this conception of a phenomenon, entails an onto-epistemological off-set, where knowing (epistemology) and being (ontology) are considered as entangled. In this sense agential realism can also be framed as a methodology, as it is involved in the ongoing performance of the world.[4]

As object of analysis: "(…) phenomena are the ontological inseparability of agentially intra-acting "components"". (Barad, 2007, pp. 308-309). The neologism of intra-action, in contrast to the concept of inter-action, denotes that the agential components, of which phenomena are configured, and their attendant agential qualities are not pre-configured, but rather ontologically indeterminate prior to the practices through which they emerge. As such, the agencies that configure phenomena must be explored to understand what phenomena are made of, and what work they do.

To this point, agential realism proposes an understanding of agency that is not confined to the idea of something that someone has (an attribute); but rather as enactments of iterative changes to practice (Barad, 2007, p. 178, p. 235; 2003, p. 827). This draws analytical attention to how agencies act. Thus, phenomena emerge through a relational ontology, suggesting that identity, agency, and separability is an ongoing performance of the world. Analysing a phenomenon, then, includes both manifesting the emergent agential components and exploring their agential qualities,

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[4] Methods are part of but *not* reducible to methodologies. Where methods denote a set of doings/techniques that can be used for producing 'data' (interviewing, surveys etc.), methodology is the entanglements through which research products (i.e., texts) become (Stanley & Wise, 2013).

as they emerge through intra-actions between the measuring agencies and the object of analysis, which configure phenomena (Sauzet, 2021b).

Co-existing Versions of a Phenomenon

A phenomenon, like 'social educators in schools', emerges through intra-acting agential components, with attendant agential qualities, and in entanglement with the way we research it. Infused with both iteration and difference, a phenomenon is not just one, but multiple, and a phenomenon might come in different versions. I use the concept of versions, inspired by Annemarie Mol (2002 & 2012), to suggest how analytical stabilizations perform different configurations of the same phenomenon (Sauzet, 2015, 2021a & 2021b). Versions co-exist, but differ, and draw forth various aspects of the same phenomenon. Some versions resemble each-other, whilst other versions collide. In co-existing, versions draw attention to the same, different, or even oppositional ways a phenomenon might stabilize in practice. Versions, in my account, are momentary stabilizations of a phenomenon, performed through 'measurement' and analysis, and as they are produced through the same research-apparatus, they can be manifested as co-existing in and across time(s) and space(s) (Barad, 2010). By performing co-existing versions of the same phenomenon, it becomes possible to address the unheeded effects of the complex intra-actions, through which a phenomenon emerges. Performing versions of a phenomenon entails reading, listening, looking, and sensing the empirical material, asking of it: through which intra-actively emerging agential components does the phenomenon unfold in practice? In order to answer this question, I now turn to use the observations from the introduction, to unfold 3 versions of the same phenomenon of 'social educators in schools'. In particular, I want to focus on the sections in the above observations marked in bold, which highlight the intra-acting agential components that produce different versions of the same phenomenon.

In version 1 the social educator sits on a table, in the corner, whilst the teacher instructs. The social educator *emerges* in entanglement between sitting on the table, the swinging of legs, bored or restless, looking at the teacher, as if to gain the same instructions as the children, whom she is expected to help once the teacher has

finished. Here, a place to sit, *becomes* a place to wait. And through these intra-actions, the 'social educator in school', *emerges* as positioned in a place to wait, uninfluential to the content of the lesson, and *performed* differently to the teacher, both in terms of responsibility and relationality to the children.

Version 2 is an intra-action of the social educator, standing by the blackboard, instructing the children. The blackboard *emerges* as a place from where to set plans in motion, and standing here, in the exact spot where a teacher once was, affords another agency of the social educator than in the previous version. Thus, the absence-presence (Law, 2004) of a teacher *emerges* as an agential component, not physically there, but *mattering*. The room, too, (inadequate in size for this group of children), *intra-acts* in containing and sustaining possibilities for a certain relationality between children and adult, concentration and unquiet.

Version 3 of 'social educators in school' *emerges* intra-actively through the social educators sitting in front of the blackboard, slouched, feet on the desk and hands behind his head, contesting being an authority. Positioned in this way, the chair and table *intra-actively emerges* as spaces of contestation. Not knowing the plan, not correcting the children further *emerges* as a performance of differentiation (a cutting together-and-apart) (Barad, 2007, p. 265) to standard modes of adulting in the classroom.

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Versions of a phenomenon do not necessarily, but can, co-exist in the same practices, and agential components of versions do not only dwell in empirical situations. Rather, versions emerge across, and are not defined, nor contained by, Euclidian conceptions of time and space. So, when empirically exploring versions of a phenomenon, that which is seen, heard, sensed, and felt in a situation, is intra-actively informed by previous (and future) times and spaces, effectively affecting how a phenomenon emerges as 'haunted' by non-enunciated, not-present, non-visible agencies (Barad, 2010). Across different times and spaces, and different multi-sensory empirical materials, analysing versions of a phenomenon thus includes an attunement to what is present, *and* to what is absent-present (Law, 2004). A phenomenon is thus

entangled across times and spaces, and in an agential realist account, this entanglement is not mysterious, because there are no different planes of existence. There are just entanglements (Barad, 2007, 316-317).

Attuning to versions of a phenomenon is a process of researching presences, absences, emergences, differentiations, cuts, and the unheeded mundane material-discursive practices of, in my case, education. It's assembling the unassimilable, and allowing research to emerge in mess (Law, 2004). 'Social educators in schools', can accordingly be versions 1, 2 and 3. In some schools they are mostly one, or maybe two, but in other schools they are all three, and more. What unites versions, is that they emerge in intra-action with the way they are 'measured', and how schools organize subject   positions for social educators. But versions also differ. Differences include being alone with children in a teaching situation, being with a teacher with/without prior time for preparation or being alone with children without insight into their previous or future activities. By following and analysing a phenomenon, multiple co-existing versions can be performed, and they manifest the complexities, tensions and contradictions of phenomena.

From a posthuman perspective, performing versions of a phenomenon, re-works questions of representation, human exceptionalism, and subject/object distinctions, traditionally attached to the concept of the phenomenon, as argued in the introduction. So, analysis is not *of* - or *on* - the world, but *with* - and *in* - the world. This consideration substitutes problematic binaries inherent within traditional modes of representation and reflection, with concerns for performativity and non-representationalism, through the tenets of an onto-epistemological offset. A posthuman approach, then, simultaneously situates and decenters human experiences of phenomena, and considers agency as emergent and distributed across human/nonhuman forces, whilst performing the hauntological relations of phenomena across times and spaces.

Performing versions of a phenomenon makes it possible to draw attention to the unheeded effects of the *doings* of a phenomenon. Both its iterations, differences, tensions, multiplicities or extendings (Sauzet, 2021a). My specific phenomenon of study, 'social educators in schools', emerges as extended between different, co-

existing, mutually incompatible, versions of performing appropriate and permitted forms of behaviour in school. In conclusion, perhaps drawing attention to the *unheeded effects of co-existing, multiple, versions of a phenomenon*, can unfold as a form of critique applicable not to individuals, but to the intra-actions that afford and effect the performances of different versions of phenomena.

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Slime

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For a while there was a craze for slime amongst the young, and it still persists, though at a lesser degree of visibility. It involved making or buying lumps of slime, of all types, fluffy, clear, thick, stretchy, thin, aerated, any type as long as it was gloopy enough to knead and pull, consistent enough to droop only slowly into whatever surface or vessel contained it. There are countless recipes for home-made slime circulating on the net. Combinations of white glue, borax powder, contact lens solution, shaving foam, laundry detergent, baking soda are mixed with the colourful and glinting elements of food colouring, clay, glitter, perfumes, iron filings. Desirable matter is made. A highpoint of fascination with slime began in 2016 and it lasted a year. The craze returned in 2019. In 2021, interest in the stuff, according to Google Trends data, was climbing again. As the moral panic that attaches to any craze cranked up, my daughter's school, like many others, left an urgent text message in the first wave, in March 2017, insisting that we prevent our children from bringing in to school their home-made slime. Shortly afterwards, indicating the wide reach of the trend, the *New York Post* reported on the symbiosis of the fad with DIY videos that circulate on YouTube and Instagram. The emergence of selling platforms such as Etsy contributed to the inflated presence of the material in the world, as well as its inventive extensions. Slime hung around for some months, left, returned, or went underground, a tenacious alien presence, and it took up residence between the fingers and in the bags of the young.

What is it about slime, this handmade or industrial gloop, that attracts children, or anyone? What is it about slime that makes it contribute to an aesthetic experience – or be in itself - an aesthetic experience? Slime is a contradictory thing. It generates the

Yuck Factor, under certain circumstances, if it possesses specific aesthetic qualities, while also being, under other circumstances, and displaying other aesthetic qualities, a desired substance for touching. Slime, not just playground slime, but slime itself, any slime – the slime on the ocean's floor, the slime of a snail trail, the slime of human mucous - appears as animated substance, an infinitely reshaping, endlessly possible, impossible, glorious tactile body, much as it might also be a repellent, self-forming, self-deforming thing. Slime is wild and domestic. It persists through time and yet is impersistent, having left from its early days barely a fossil record. Slime is deathly and it has a life of its own. It is the thing itself and its residue, excess or trace. It is human – we produce slime – and it is alien, at least in fantastical terms, as countless horror splice SF movies attest. Slime straddles multiple realms, our world and the otherworldly – and if the splurging of slime from the mouths of actors in horror films was seen by millions in 1984 in *Ghostbusters*, that is not to say that oral ectoplasm, as fascination, does not have a longer history. If slime is of the moment, it is also of the past. In the form of ectoplasm, through Charles Richet's experiments in psychic phenomena and through F. W. H. Myers, who used the word ectoplasm in his *Human Personality and its Survival of Bodily Death*, it became the name for a substance or spiritual energy which is produced by mediums when in a state of trance (Meyers 1903). Ectoplasm is 'a viscous substance ... from which spirits make themselves visible forms ... alive, sensitive to touch and light ... cold to the touch, slightly luminous and having a characteristic smell' (Warner, 2006, p. 290). The slime is an expression of the possibility of an unseen brought into vision, an otherness made palpable, brought before human rationality and an undermining of it. Slime is sublime.

The sudden fixation on slime in the schoolyard does not convey the mysticism of ectoplasm, though it hints at every horror film and at what lies beneath the horrified yet fascinated relation to slime as an otherworldliness. It might also evoke another sublime, the sublime of new materiality, which is current and pervasive. Contemporary science expends much energy on advanced materials, engineered substances that improve on nature. Sometimes they draw on nature, in order to find ingenious ways to do things that were previously done elsewise or never done before. Biomimetics applies principles from engineering, chemistry and biology to the synthesis of

materials, synthetic systems or machines that have functions that mimic biological processes. Slime moulds for one have been used for urban design, specifically road planning. Physarum polycephalum, the 'many-headed slime', is a plasmodial, single-celled organism that expands from a single point, in its quest for food sources. Having located them, its many branches die off, leaving a slimy, single-celled efficient route between the nodes of food sources. There are suggestions, not fully comprehended, that the slime may possess a memory of those lost routes, which could be operationalised one day.

And here is the contemporaneity of slime in its various forms. It casts inherited notions of matter aside, in alignment with much of the work of contemporary science, which turns its focus to advanced materials and a re-imagination at the atomic scale. Soft matter – liquids, colloids, polymers, foams, gels, granular materials, and liquid crystals – are self-organising, atomically capricious materials. They possess capacities, such as liquid crystals' birefringence, generalised elasticity, mesoscopic, intermediate scale, symmetry-breaking, degrees of freedom coupled with responsiveness to inputs. These odd physical chemical components lend themselves to complex systems approaches. Liquid crystal is slimy. Mucus, slug trails and cell membranes are liquid crystals, existing between solid and liquid, as are detergents and soaps when dissolved in water.

Slime in the playground is a trivial craze, but there was a moment when it was forwarded as on-trend by a trend analysis group, called WGSN (World's Global Style Network), the self-described world's trend authority or decoders of the future, the kind of publicity agency who put out press releases on the colours of the next season, and, for all their boosterism, they could indeed be engaging in a Kracauerian collation of various surface manifestations, even if this is for purposes of advice to advertisers, rather than in order to understand something more trenchant about contemporary capitalist society. The WGSN report from Spring/Summer 2015 was titled *Bio Dynamic* and it was illustrated with an image of a model, whose head and face was largely covered in drippy blue goo as if a can of emulsion had been poured over her. Evidence for the bio-dynamic trend was gleaned from a variety of sources, science, art, design,

philosophy. It included a reference to Ben Woodward's Zero pamphlet *Slime Dynamics*, from 2012, which the report noted 'celebrates the dark vitality and unpleasantness of life'. It evoked the Human Microbiome Project, which tracks how the human body is colonised by a myriad of microbes, some existing within slimy biofilms. The report invoked an MIT project to improve 3D printing, whereby tiny magnets were attached to the heads of silkworms to discover how they 'print' their pupal casings around themselves, using various gradients, a tough exterior, a soft interior, its head rotating in 8-figure movements as it distributes different densities and thickness of silk. Art was brought in as evidence of the turn to slime and bio-dynamism. Stefan Gross' melted plastic toy artworks, Vibha Galhotra's paintings using contaminated waste, Anne Buscher's hardened goo slippers. Present too is the work done with what they call 'brainless, single-celled slime moulds', which 'can be programmed to function like biological computers and which can design networks for mobile communication, and transport and blood flow.

The trend analysis opens with this observation:

> "Bio-dynamic sees the way we understand form, structures and even our own bodies completely revolutionised. It inspires us to create products and systems based on the fluid intelligence of basic microbial life forms. Scientists, sociologists, artists and designers are embracing the mutability and unpleasantness of slime and bacteria, finding hidden secrets in the vital substance of life." (WGSN, 2015)

It goes on to note:

> "Scientists search for the key to complex networking in slime mould, a natural organism with intelligent navigation abilities. Cultural theories look towards the vibrancy and vitality of basic life forms as a way of understanding contemporary culture." (WGSN)

This all translates for WGSN into minglings of styles, ugly pretty, micro-networks, the aesthetics of ooze and goo with the clean lines of modernism now melted, morphed and liquefied and 'ickiness' celebrated in jumble heterotopias. The concept of mutation from microbiology becomes a style-tic that merges well, of course, with constantly re-stimulated consumer desire. But more than that, the object of the trend becomes an active maker of what is trendy, usurps the role of designer, embodies itself, or constitutes itself that which is so desired. As WGSN writes in relation to slime mould: "Despite being a brainless substance, slime mould creates complex networks that equal those of our best designers."

Of interest here is the way in which the basic life form of slime is endowed with more creativity and also more life. Creativity and life appears where it is, or was, thought it would not be and our life, human life, becomes life reloaded as we humans are evaluated as microbial rainforests, teeming sites of multiple lives. Other actors, or actants, sublime slime, feisty yeast, fluidly intelligent bacteria, border phenomena, in-between realms, provide a dramaturgy of and for things and people, at a time when human life is life reloaded as the human is recoded as holobiont, microbial rainforests, teeming sites of multiple lives, hodgepodge heterotopias. Intelligence, but not as we know it, and potentially better, because it could not be worse than the one that has messed up the planet. And anyway, perhaps it is time to shift humans away from centre stage and give the cosmos over to other lives, other beings that can shape and reshape it divergently.

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The Glove as Tool To Touch: An Intra-view from Within New Dawn Felipe Duque in Conversation with Swantje Martach

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Abstract

New Dawn is a global arts/theories queering project, which was initiated in Berlin in 2020, and which speculates future aesthetics of the glove as "tool-to-touch." The present intra-view is a real 'view-from-within,' as it unfolds a conversation (a turning, moving, becoming [*versare*] together [*con*]) in-between the two members of this project's theoretical section: Felipe Duque and Swantje Martach.

This intra-view sets out to explore the role the glove plays within the touch. A gloved touch differs from a non-gloved touch, as the glove heightens the touch. The glove functions as a first other that is encountered in the touch, hence it is touched and touching us back. And it is a medium for and mediator of touching other others, as it is through the glove that the ordinarily touched (the world) is touched. By means of this double position in the touch, the glove emancipates from human control. It enables us humans to realize many touches that we alone would not be capable of, and in this way, it emancipates us from our limitations as humans. The glove is a very material invitation to become, that increases with every new gloves invented, a switch to which is just another un/dressing away.

By focusing on the glove/hand entanglement, New Dawn can be read as promoting the haptic sense as a hitherto neglected contributor of the aesthetic. Being self-critical however, we argue that depicting the future of touch by means of the glove eventually is a rather restrictive speculation, as it limits all touch to the one we exert by and experience from hands; whereas reality disposes a multiplicity of touches (e.g. a touch between shoulders, eyes, lips). To expand future touches could thus be an interesting continuation for New Dawn.

Keywords

glove; tool-to-touch; speculative aesthetics; futurism; fetishism

Introduction

The following text is an intra-view, an 'interview from within' the non/human multiplicity that names itself New Dawn, and that materially/discursively (which is to say: via processes in which theory and art/design enmesh) speculates future aesthetics of the everyday object of the glove, which herein is defined as 'tool to touch.'

'From within,' because who in a conventional role allocation would be the 'intra-viewer' Swantje Martach (SM), as well as who would be 'the intra-viewee' Felipe Duque (FD) are members of this arts/theories queering initiative, so that this intra-view is to be seen more as a dialogue than a Q&A, viz. as a 'conversation' - a term which owns the connotation of a turning together, a converting each other - that materializes thoughts which circulate within, which haunt New Dawn, and are thus responsible for the very formation of this project. This intra-view intends to be a true democratic exchange of thoughts, that as such methodologically corresponds to the topic it is to engage with: the (here: gloved) touch, which the "philosopher of touch" (as Derrida baptized him, see introduction to Nancy, 2021) Jean-Luc Nancy describes as being always a reciprocity: "one cannot touch without being touched" (Nancy, 2021, min. 4:33-4:38).

In November 2019, his fascination with virtual reality gloves incited Berlin-based photographer Tobias Faisst to initiate New Dawn and gather in total 59 individuals and studios working in the culture sector, that today form part of the project's team. Soon thereafter, Vienna-based theoretician, DJ, and editor-in-chief of *ENTKUNSTUNG*, Felipe Duque - in collaboration with whom the present conversation materialized - joined Tobias in his undertaking.

In early 2020, New Dawn's team was ready to start speculating future aesthetics of the glove. The basis for the multiple working streams realized in New Dawn were 'analogue' which is to say: materially handcrafted gloves, that materialize specific vectors of becoming that we experience of and with the glove. Outgoing from

the material, New Dawn photographed, post-produced, CGI-embedded and -animated
, choreographed, danced, filmed, styled, wrote, and virtually exhibited its gloves. During
this process, the gloves were constantly shifting, and *peu a peu* allowed New Dawn to
approach their future aesthetics.

The present introduction attends to this processual manner of engaging with the glove
because of two reasons. On the one hand, New Dawn's approach is processual
without being linear, and as such is of high interest for new materialisms that are
generally characterized by a re-thinking of linearities (see e.g. Barad, 2017; or Dolphijn
and van der Tuin, 2012, p. 163). At times, the virtual embedding of the glove happened
on the basis of its model, and its handcrafting thus was likely to happen parallel to its
virtualization. Once the neutral picture was taken from an analogue glove, its
embedding into a speculative environment likely happened simultaneously to its
being-danced. And it's being-danced was filmed, so that being-danced and being-
filmed are two steps that the glove experienced at the same time.

On the other hand, it is precisely in this process that the glove becomes an actant,
becomes determinative for a circularity of 'next' steps, which is why New Dawn as
such can be denoted as a 'non/human' multiplicity. To a high extent, it is the glove that
specifies its speculative CGI-environment. It is the glove that 'is danced,' that steers
the movement of the dancers and thereby materializes itself. And it is the danced,
even: the dancing glove that dictates the movements of the camera and the cuts of
post-production, for the sake of best revealing the intentionality it contains.

Already during the work on, and following up on (another timely circularity) the release
of New Dawn's virtual exhibition, its medial distribution began, which shall here be
regarded as a mere spatial widening of New Dawn's processual character. In this vein,
New Dawn's Instagram account (@newdawn.digital), exhibiting material and
discursive bits and pieces of New Dawn, is as much part of its core work as its
website's exhibition. The 'stories' contained in the former, in which initiator Tobias (at
times on the suggestion of other New Dawn members) explores and sets out to bundle
the vastness of artistic/design works featuring gloves that can be found in this social
medium, enmeshes with the mood board he sent out in his initial call for participation.

And texts uttered from within New Dawn entangle with press texts written about New Dawn. Theoretic text researching and media texts promoting New Dawn circularly refer to each other. And interviews with one member of New Dawn engage with and scrutinize interviews with other members of this arts/theories-queering project.

This intra-view, which was realized via ZOOM, recorded via the voice memo function of an iPhone, and then typed down as close to the original conversation as possible, can thus be seen as one part of New Dawn that is as 'central' in this non-centralistic and rather rhizomatic undertaking as a particular glove is therein: All are materializations of the idea that flows within and overflows New Dawn, and as such are democratically entangled. A last remark before the intra-view begins: During the textualization of the intra-view, square brackets were added to include information and explanations; all round brackets were meant as such during the oral/medial intra-view itself.
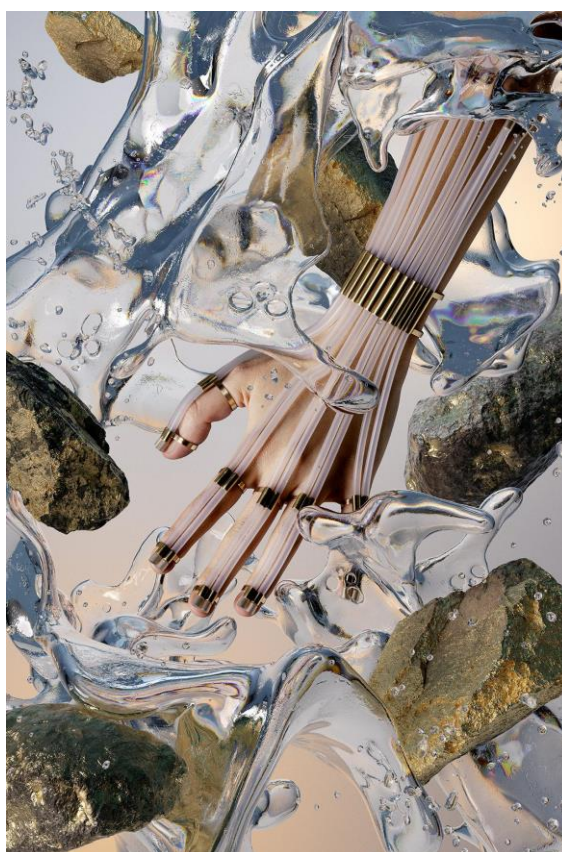

Figure 1. Jewelry Glove (glove: Johanna Gauder, photography: Tobias Faisst, retouching: Studio Wolfram, CGI: Kiwi Bravo & Edu Torres, 2020)

Intra-view

SM: Let me briefly introduce you to the scope of the present virtual get-together before we start with the intra-view, which I have the honor to realize with you, Felipe! The topic of this conversation is not intended to be the glove in its ontological approach as an object, nor the sketching of an ontology of the touch [What is the touch? What affords the touching? What is the touching capable of? As in-depth researches focusing on such questions, see e.g. Nancy, 2021 or Manning, 2007], but it rather shall be the role the glove inhabits within the touch. In the following, we shall thus regard the glove as a touching medium as much as a medium for touching, as a "tool to touch" as you, Felipe, also named it so adequately for New Dawn. In a former work I did on and with New Dawn [see e.g. Martach, 2021], I claimed that the glove 'shoves' itself in-between human and world, even human and reality, and mediates the touch in the sense of the human's haptic perception and understanding of the world.

FD: If we talk about the glove as the 'medium,' I read this as asking for the touch that the glove allows me to realize. But what about the touch that the glove does to me? What I like to call the 'fetish' part of the glove is that when you dress a glove, there immediately is a contact that, dependent upon the glove you are using, triggers something different. There is an initial touch, a touch not via, but with, even from the glove. And only via this first touch, you become capable of performing things, hence you become capable of touching.

Even if it is just for work, when you dress a glove, it immediately changes your performativity. One could even say that your own performativity becomes the performativity of the glove, the glove's own performativity. For instance, by getting my hands into my bicycle gloves, I become a mechanic; by getting my hands into some rubber gloves, I enter a cleaning mode. Gloves have the capacity to immediately make us enact what they determine for us. For this reason, I think of gloves as highly powerful devices.

SM: Would you hence agree with me in saying that the glove ontologically is an attitude?

FD: I am not sure if it 'is' an attitude, but it certainly enables an attitude, or a modus. It enables you to perform something, to enact a performance. When I was 16, I was living in New York and working at McDonalds as a dishwasher. I see this experience of mine as strongly determined by the gloves I was wearing for work there. Coming to work, I would enter the restaurant, see the pile of dishes, dress my gloves, put my headphones on, and for two hours or so be in this washing mode which I regard as enabled by the gloves.

The glove incites an action in you, it creates a certain mindset for you. There is this first touch, the touch with the glove. There first is a *Darstellung* of an action by the glove, and only thereafter comes its enactment — by means of you, through you as a medium. And through this enactment, the action is not anymore an act, but it rather is just a being.

SM: I really enjoy the latter thought you expressed, Felipe. In my work on the 'clothing,' the daily dressing relation, I usually define the cloth, the dress, the garment as a 'first other' we often unconsciously are engaged with while being engaged with 'other others,' further things in the world. We usually wear clothes while we eat, while we sleep, while we work, while we do sports, and while we meet friends. I am thus generally curious about clothes as manipulating our reality in ways we are lacking knowledge of [see e.g. Martach 2018]. So while I speak of the cloth as a 'first other,' and thus would define the glove as a first other we encounter in the touch; you just defined the glove as providing us a 'first touch.'

I think Barad's concept of "self-touching" [see Barad, 2012, p. 5] can also clarify further what I suppose we both mean here. I claim that we can see the glove as a form of self-touching, because as long as I wear a glove, there is something, an actant, an existence, that presses itself against me. In fact, this pressing becomes heightened when I glove-touch further things (e.g. hold a cup, or grab another - gloved? - hand), because my touch with this other thing presses the glove-thing against me, and the glove-thing crucially does not retreat, has nowhere to evade, but remains right there, in-between me and world, and steadily presses itself onto me and the other other

equally. In this vein, we might tentatively suspect that the glove 'wants' me to touch other others in order to engage with it, in order to touch itself more intensely.

FD: I like when you say that the glove "wants me to touch other others." I perceive garments in general, and the glove in particular, as a game of alterity or multiplicity, as representing without drawing too much attention to the fact that the queer and the ephemeral are always right there, directly with us, on our bodies.

SM: However, when we both speak about a 'firstness' of the glove in the touch, then we do introduce a sequentiality here. Would you really say that such a sequentiality properly depicts reality? Is it indeed true that the glove's touch comes prior to the touch of the other, which is to say: the other other?

FD: If we put it in a sequence, then I see this as initiated by an idea (what I priorly meant by the *Darstellung*), an image that I create before using the glove. It all begins with the thought: "I need gloves," for instance in order to ride a motorcycle, or to wash the plates. This incites the first touch, in which I wear the glove and the glove is holding me. This first touch has information. It informs the body about its new, its widened set of capacities. And only then comes the moment in which I dare to touch, dare because 'glovedly' touch the cycle's handlebar, or the first dirty plate.

Yet I do not regard this as the glove's specialty. The same happens when I dress e.g. a suit, or high heels. The moment when I jump into these heels, I will be tall, I will stand erect, my body posture becomes another, as well as my walk. And as soon as I enter the suit, I become, e.g. a professor, or a banker. I dress these offices by dressing into them. 'Clothes,' as you name them in your work, do something to you. They change your body, and you know that they will change your body. The same is valid for the glove.

SM: When we think of dressing the glove in order to, then I certainly agree with you. However, when remaining in the conventional timely linear manner of thinking, then after the dressing there is, or even: with the dressing starts another reality, namely the one of wearing the glove. For our purposes, I claim that the concept of 'wearing' means to say that the glove and its 'first' touch remains there, its engagement with the hand

continues to happen throughout the action of washing plates, or riding the bicycle. In this vein, I would suggest to shift our conceptualization from a temporary firstness to a local primary, because in effect, very materially, when we wear gloves, it is through the glove that we touch everything else.

FD: I agree. And what is more, there is also a certain fetish in the way we engage with, hence in how we wear gloves. For instance, in the past I did professional BMX. For about 15 years, every afternoon I was wearing my BMX gloves. Very soon after I started this sport, these gloves shifted from gloves that I would simply wear, to a garment that receives specific attention. I would determinedly speak up for, and wear precisely these gloves from precisely this brand. And every now and then, I would have these new gloves, this freshly released model, that would crucially improve the experience of my BMX-riding.

Still, I needed these gloves for the riding itself, for protection, for the rules of the game. But there was more to my gloves-wearing. My gloves alienated me from the others. They lifted me up. They were more than just gloves for me. I was alive with them. There is something inherent, this use value, that changes the relation that we have with ordinary things.

For New Dawn, we speculated gloves as 'wearables' [which is a term used in the respective métier for intelligent pieces of clothing, viz. for dresses that include smart technology, such as the solar panel dress made by Dutch designer Pauline van Dongen, that already achieved to find an access into academic thinking, see Smelik, Toussaint, van Dongen, 2016]. As a role model for us functioned especially the postmodern smartphone, which I also like to call the 'tamagotchi phone,' because it tells you how many steps you should take, how many calories you ate, when to go to bed, when to wake up, and so on. This whole thing is alive. So we thought: "What could come next? What other thing, apart from the telephone, could be alive, maybe: is already alive? The liveliness of which other thing could we use for our purposes, and how could we use it?" Apparently, the answer we found is: the glove.

SM: This is highly interesting. In a former interview from within New Dawn, that I realized in the frame of a conference contribution [see again Martach, 2021], Hongwei

Tang, the coder of New Dawn, mentioned something that I consider as contributing gainfully to this thinking about the gloved touch that we are presently undertaking. On the one hand, he already said that the glove is mediating the touch, hence that it is of the glove that we are receiving a first touch. This first touch, so one could add, is materializing in this very tiny yet highly determinative space between our fingers and the glove, that might be not even a millimeter wide, if the glove fits really tightly. But one other hand, Hongwei expressed the thought that very often, the glove is not intended to be witnessed. The glove does not want to be experienced, but rather strives to hide, to withdraw in the touch. It seeks to hide itself, if we ascribe to the glove this kind of agency.

In this vein, Hongwei instanced the medicinal glove, which is exclusively intended to enable us to fulfil certain actions, e.g. touching the injured body. But from the perspective of the glove, nobody really ever should think about the very action that is already in the glove, about the very touch of the glove. Put differently, we could say that it is always about the touch with the glove, but hardly ever about the touch of the glove. I see this as creating a very peculiar tension, would you agree?

FD: From my perspective, it is the other way around. I do not regard the glove as hiding. But for me, it is more about saying: "I am here, I am the one who allows you to, who enables you to perform. Without me you cannot do this." I see the glove as exposed in this role.

SM: For New Dawn, you called the glove a 'tool to touch.' Up to today, I read this in a Heideggerian vein, as stating that the glove is a tool, and as such is *zuhanden*, ready-to-hand, and precisely not *vorhanden*, not present-at-hand [see Heidegger, 2006, pp. 83-84]. In how Graham Harman pulled this Heideggerian distinction into object oriented ontological thought, your definition can be interpreted, how I so far did it, as if stating that the glove-tool pretends to offer itself completely for our usage, but thereby creates a blind spot in our attention. And precisely this blind spot allows it to act on us in manners that we usually do not witness [trying to paraphrase here the overall message conveyed in Harman, 2002]. I also see Hongwei's thought as pointing

into this direction. But now I start to wonder, did you mean the glove's definition as a tool in a distinct manner?

FD: When we called the glove a 'tool to touch,' we did so in the attempt to not think of it as emancipating from human control. We intended to give the glove agency. But we humans are the ones who are giving it agency. The glove does not have agency by itself. But the agency is what we do to it, and when we do what to it. For me personally, the idea of fetishism was reigning over New Dawn, the inquiry into how things live, when we grant things a life. To go back to our role model I mentioned earlier, smartphones are always present. They are there when we eat, when we watch television, when we go to the toilet, they sleep next to us, and so on. We give things a life, but only ever through the practices in which we engage with them.

Whereas some members involved in New Dawn had a more dystopian concept in mind, in which they speculated the glove as almost already an AI, an autonomously acting subject that is intending to gain the upper hand over us, other participants, me included, were more drawn to speculate an utopian idea of a future in which we can interact with gloves, yet which still affords both, the human and the glove. We thus tended towards the incitement of a symbiosis between object and human, in which we imagined the human orienting towards the object in a thought such as: "We enable you. We give you an agency. But in return, you also help us. And together we can create a certain kind of reality." The terminus 'tool-to-touch' intended to imply exactly this, that the glove enables me to do many things that I alone as a human being would not be capable of, because of my limitations as a human.

SM: This clarifies pretty well the democratic or rhizomatic entanglement as which you define the future of touch. Besides, another thing that always comes to my mind when reflecting about the relation between glove and touch is that I somehow see it as a disadvantage, a material/conceptual shortcoming of the glove (which by ordinary definition is a dress we apply onto our hands) that it reduces the sense of touch to the hand. Yet it is obvious also that the hand is not the only body part with which we can touch. We can give each other a kiss with our lips, or with our noses. We can touch each other's elbows, or even 'shake our feet,' as it has recently, in COVID-times,

became a fashion. So the touch is omnipresent within, even an 'omnipotential' owned by the body. If I thus regard New Dawn's gloves as also working on the issue of a future touch, which obviously was not the project's primary issue, but if we think of them as such, then I feel this would be a limitation of New Dawn.

FD: Definitely. It is reducing your body and the senses, your whole body to only one region, whereas in reality, you perceive via the whole and distributed program of the senses. To say: "this is for this, and that is for that," is always reductive. For me, it is the same as reducing sexuality to a kiss on the mouth, or to the genitalia. If we think of New Dawn as an idea of a future in which you can only touch with your hands, this would not be such a nice future I opine, maybe a bit boring in this regard.

SM: I am thinking here of public signs, board games, or school books: When they show a hand, then the message they wish to convey is always connected to the touch. Apparently, the hand achieved to become the epitome of the touch, in a very stigmatized, ordinary, commonsensical worldview. But you might remember how Deleuze and Guattari talk about the "body-without-organs" as a goal worth striving for, in delineation to the ordinary organist structuring of the body. As they say:

"Is it really so sad and dangerous to be fed up with seeing with your eyes, breathing with your lungs, talking with your tongue, thinking with your brain ...? Why not walk on your head, sing with your sinuses, see through your skin, breathe with your belly." (Deleuze and Guattari, 2004, p. 167)

I feel that this thought could be very nice when integrated into New Dawn.

FD: This reminds me of the 90's in New York. When you rode an elevator, you were socially obliged to not look at anyone, to only stare at the floor. Because in case you, as a man, would look at a woman, it would immediately be embarrassing, it would be like: *harrumphs intendedly*. When these days we regard it as normal to not touch a stranger, e.g. in a bar, back then this rule of 'social distancing' included the look. You were not supposed to look at each other, because the look was already the touch, the look contained the touch within itself, so to speak. You were seen as touching with your eyes.

These days, the eyes are still allowed more things, and also more things than the hands. Just think of the situation in which you intend to pass by a stranger on a crowded street, or on an escalator. You really have to ask yourself: "How do I best do this? How do I realize this action without causing irritations?" Because you do not want to end up in a situation uncomfortable for all participants.

SM: For so doing, many people do a sort of 'fish' gesture with their hands, holding one of their arms close to their body, with the wrist as high as probably touching their chest, the hand standing in a 90° angle from the arm, all five fingers tightly pressed into each other, a very straight hand posture, as if their hand would be the bug of their body-ship sailing through these stormy and unpredictable waves of people.

I find the position of the hand in relation to the body here to be a very peculiar one, as here the hands are locally primary. They are a first touch. They are blazing the trail, carefully advancing, probably because intended to be the most harmless potentially touching part for the entire body of the other. They act as a sort of security shield, a cushioning between the two bodies. And in this cushioning, the glove could be of help as an extra layer of textile in-between the two bodies that do not wish to, but might happen to touch each other.

FD: I like the metaphor you are using here. Back in the 90's, such actions were undertaken in order to keep, and visibly stress one's intention of keeping the distance between each other.

SM: To try not to touch whilst touching.

FD: Exactly.

SM: At the ICI, the Institute of Cultural Inquiry here in Berlin, they are currently hosting a series of talks about the touch. One of them, which was held by Tim Dean, was called "How to Have Sex in a Pandemic." I see this as telling much about where we are right now. This COVID-situation has increased the relevancy, the significance in the sense of the expressive power of the touch. It seems to create a ban of touching, that applies even in the private.

FD: And precisely this situation creates tension. On the one hand, it asks for an increased control over the own body; and on the other hand, we also experience a missing, meeting a friend, embracing each other as a greeting, receiving an appreciative clap on your shoulder: "Well done!", or simply a conversation with someone next to you. Today at the office we were having a ZOOM-talk from different rooms in the same space. We are getting so used to these kinds of things, that once we happen to meet live, to be confronted with each other's bodily beings in reality, we don't have anything to talk about.

SM: Yes, this social distancing is creating an awkwardness, also at times when it is broken. But these small moments of breaking the rules, these tiny ruptures, even if it is only a clap on a shoulder, are also highly necessary these days, I opine.

FD: And we can draw the analogy from screen to glove. The glove is like this screen through which we are chatting right now. This screen enables us to have this conversation between Berlin and Vienna, just like the glove provides you the possibility of doing certain actions that without the glove you would not be capable of realizing.

What is more, the screen also inserts a game into the how of this conversation. It allows us to filter what we show, what we present or expose, and what we hide, just like the glove does it to and for us. I like to think of both the glove and the screen as devices that mediate our presence. One could also think of them as functioning like a joker: They open up some things, meanwhile they conceal others.

SM: I totally see your point here. Would you hence say that the glove inserts a game of expectations into the social sphere?

FD: Indeed, yes. And we also have to manage our expectations in relation to the glove itself. In the fetish thinking, we give love to objects not only because of the object, but it is about what we expect that this object could give us. But this also entails the possibility of becoming disillusioned.

I might expect a glove to keep me warm in winter, but when I go out, I realize that it does not. Or I might expect its fabric to feel comfortable on my hands, but after a while, it makes me sweat. This is what I mean by the glove's tool factor: As humans, we still

want to be in control, so we impose expectations on the objects we engage with. All we do is projecting. We project on our gloves that they perform in a certain way. Maybe I selected the right one for this weather, or I took the wrong one. Maybe I chose the cheapest one, and it surprisingly meets all my needs. Or I bought the most expensive one, but still am unhappy with it. You cannot entirely foresee the glove's degree of smooth functioning prior to every specific wearing situation.

SM: Which reveals the clothing to be an unpredictable, even uncanny, but also a highly fascinating practice. I wish to argue that the glove can also be a shelter. What I have in mind here is for instance a gardener, who realizes projects in very different gardens and with distinct clients, but he always wears the same gloves, his gloves. Or as you said before, as a BMX biker, you might have driven to distinct tournaments, and rode different courses, but luckily, you had your gloves with you, that gave you support, comforted you, that provided you a sense of security in how they touch. Maybe we could even think of the 'grip' that the gloves give in this example in the double sense of allowing for a firm touch and providing support?

FD: This is a nice wordplay! Or one could also speak of the composition of safety and security. The feeling of safety is provided by a proper hold. It means protection. But the feeling of security, even of self-security, a confidence and motivation is brought forth by what could be titled the 'aesthetics' of the glove. Wearing a specific glove, like for instance the jewelry glove Johanna Gauder created for New Dawn (see figure 1 above), you feel prettier, more attractive. Or when you wear New Dawn's Black Latex Glove (see figure 2 below), you feel aerodynamic. This is to say that the glove creates a feeling that improves performance. The same happens when you wear your favorite shirt to go out. You have a mojo. You come with an extra.

Figure 2: Black Latex Glove (photography: Tobias Faisst, retouching: Studio Wolfram, CGI: Lukas Popp, 2020).

SM: As you already mentioned the aesthetic, now it is the time for me to add a second aspect to the thought I expressed before. So far I said that the glove's restriction to the hand (and probably the lower arm, as it is the case in several of New Dawn's gloves) is a limitation of the haptic sense. But on the other hand, I feel capable of arguing in favor of our, of New Dawn's actions and selection of the glove as a subject matter for a 'future aesthetics,' because when you inquire into the history of the aesthetic, it soon becomes visible that prior to what we are doing today, always only the eye and the ear, viz. the visual and the auditory sense were foregrounded. But despite Cicero, who is a remarkable exception in his praise of the hand [see Cicero, *De Natura Deorum*, II, e.g. LX (here cited edition: 1967, p. 267)], the hand was hardly ever mentioned in ancient theories of beauty, art, or sense perception. Apparently, it was not held as capable of inciting us with proper aesthetic experiences. In this vein, could we say that in New Dawn, we are trying to level this historical imbalance in the awareness of the contribution of the different senses to the aesthetic?

FD: This is a very apt way to express our scope. And I can even add that historically, one's artistic taste was always regarded more important than the experience one lived through in relation to art. So in the art world, the sense of taste was classically rated higher in importance than the sense of touch. And even in music, for instance in Kant or in Adorno, as paradoxically as it might sound, the sense of taste was prioritized over the sense of hearing. There thus has always been a hierarchy inserted in the senses, and touch was at its very bottom.

However, this is not to say that the aesthetic cannot be narrated alternatively, and that its sensual hierarchization has not undergone changes before. Whereas classically, the narrative of art was entirely visual; its performative narrative is pretty young in comparison. We can easily speculate the touch as being another step in the evolution of art's perception, in part because this change has already begun: Immersive art invites you to trigger all your senses, not only the visual one. House and techno both are immersive genres of music, and precisely the immersion they provide explains why they are so powerful. It is because of the base they both include: something you do not hear, but which vibrates in you, which moves your body.

SM: Such a nice analogy! I never thought of the base in this manner before, but it entirely makes sense. Let us stay a little longer with this historical hierarchization of the senses, which remarkably already the Sophists introduced [see Plato's *Hippias Major*, 298 A and 301 D]. So this grading really has a long history. If I read the respective literature correctly, the reason why they allocate the touch a lower position within this hierarchy is that they think of the sense impressions we get from our ears and eyes as giving way easier for being ordered by our minds; meanwhile the sense perception we receive from our hand, or from touching in general would be more confused, would not allow to be cognitively structured [see e.g. ibid. 303 E]. I do see a paradox here, because later on, the aesthetic was precisely defined as a sense perception that is, as Shaviro recently called it, "without criteria," so not structured.

FD: I suspect a connection here between the locating of the aesthetic in eyes and ears, and the cultivation of both respective senses. In contrast, the touch is something

direct. It is a pragmatic sense, it literally is 'hands-on.' It simply is there, either felt or not felt.

SM: But are there not manners of touching also? I mean, I can touch in a hands-on manner, but I can also caress, or crawl, hit, tap, or touch in many other ways. Also the touch can be cultivated.

FD: Yes, but this is only possible to conceptualize nowadays. After Antiquity came medieval Christianity, which was a time in which the court would be having sexual intercourses with a mantle between the two 'lovers,' with a hole in it for penetration only. A sort of 'all-body glove,' so one could put it. This they did because it was not customary to touch another person's body. The touch of the body, a touch in-between two bodies was seen as connected to mere sensual pleasure, as the Bible repeatedly calls it: the mere flesh; whereas these people were striving for, were only regarding as appropriate another pleasure and hence touch, namely the one of the soul. Much later still, we can detect traces of this thinking in the theory of music, which was regarded wholly a product of the intellect, but not a hand-crafted thing, a product of strokes and strings and pressures and pinches.

SM: Indeed, this is true. Even though in Antiquity we can find an alternative position, the hedonist one, which was elaborated by the Sophists and deepened by the Epicureans. But apparently, a more transcendental worldview suppressed hedonism, and the latter only achieved to revive within Modernity.

So, Felipe, we kind of touched on all the points that I intended us to discuss. The last and rather open question that I would like to direct to you is: In how far is the glove itself a conglomerate, a multiplicity? I am asking this because I feel that in New Dawn as well as in commonsense, we are mostly thinking about the glove as well as the hand as a unit. But if we look onto both subject matters, we can see that they contain at least five different participants, five distinct directions, and hence five vectors of becoming. I thus wonder, what happens if we change our conceptual approach and go one more step into the detail, hence when we stop thinking of the glove/hand as a unified whole but rather think of it as sending out several messages?

FD: Certainly, in New Dawn, it is all about the hand, the hand as a whole, and not so much about the hand as a sum of parts. But if we consider it that way, I have to think of an octopus. Its tentacles are a multiplicity of independent organisms in this really complex organism. Besides, the hand as multiplicity is already made manifest within its symbolism, in which each finger stands for something else, is seen as representing a different realm of culture. There is the finger that says: "I am (/not) married," side by side to the finger that says: "fuck you." In this regard, the hand is already performing different roles, and is capable of performing them simultaneously, all at once, as a multiplicity.

SM: And this multiplicity becomes even heightened by the fact that this symbolism shifts among cultures. I am thinking here of for instance the Italian sign language, with all its very specific postures and gestures that makes the hand move and hold itself in ways it does nowhere else in the world [Bruno Munari created a remarkable dictionary to approximate their richness, see Munari, 2005]. And when speaking of hand gestures, if I recall it correctly, then the thumbs-up, which for us means "it's good," for Chinese people means "fuck you."

FD: Yes, or just think of sign language as such. Here, the hands are already opening worlds. They are already performing as a language. And what a rich multiplicity is a language!

SM: In this regard, I think we can define the glove, and indeed also the touch, as two among many ways in which we can use the hand, a sort of application of the hand, that crucially 'in practice' heighten and enrich the multiplicity that the hand ontologically is.

What is more, in this stream of thought, what does it mean when I have these different possibilities of becoming, that materialize in distinct fingers, and I then take my entire hand in order to grab a pen, and in this action unify, standardize, or streamline them all? What does this say about me? And if we turn the common direction of thought around: What does it say about the touch, not anymore the role of the hand for the touch, but rather the role of the touch for the (gloved) hand? In such situations, am I ignorant of the multiplicity literally 'at hand'? Or am I especially clever in using them

for my purposes, viz. am I the conductor of an orchestra of fingers in every touch I undertake?

FD: Involved in the how of the touch, I see an aesthetic as well as a historical component. As a matter of fact, many things we touch daily, such as a smartphone cable, a kitchen cloth, or a fork, we are capable of holding with very little effort, with little pressure exerted by our fingers. But indeed, we do not always reduce our touch to the least effort its functioning affords. At times, we might hold a fork in an enclosed hand, a determined, not to say aggressive gesture, which signals a readiness to do whatever it takes in order to seize that food. And then again, we hold a fork in just two fingers, a delicate and open as much as elegant, subtle, even aesthetic gesture, that leaves room for play and interpretation.

But these differences in touching are not only of an aesthetic, but also of a historical nature, as they are often read as signaling the sort of family you stem from. Without going more into the depth of social norms of eating, another example would be the how of an embrace. Whereas lovers might embrace each other in a soft and gentle way, an easily flowing 'intra-touch'; the embrace rather reserved parents often give is characterized by tightly stretched fingers, clearly separated from each other, that produce more of a rubbing than a proper caressing, and thus convey a really cold, and harsh, even hollow feeling. They show you another level of being 'care-ful'.

SM: An interesting term you are selecting here: careful. If I interpret you correctly, you mean to say thereby that to be full of care can on the hand mean: to be orientated towards and care for the other; but it can also mean: to be mindful of the how of your touch. Whereas the former means to dissolve in, to move with the touching flow, and to allow the touch itself (a trans- or multi-human subject) to gain the upper hand, which thus produces a haptic encounter of a hearty sort; the latter is not always a good thing, but too much orientation on the touch itself can cause a break, a rupture, a friction within the touch. This shows once more that the touch itself also is an other that we can get in touch with.

To subsume, I think we can conceptualize the glove as one manner of touching among many, as well as an increase factor in the multiplicity that the touch is. Thank you Felipe for this enriching conversation!

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The intersections between reflexive and critical thinking and literature are both constant and changing. Literature is more than pleasure, distraction and leisure; literature gives us something to think, and to think about. Philosophy, on the other hand, aspires to conceive the literary fact from the strict discipline of the concept, to produce reason out of it emerging from an anthropocentric knowledge, as well as its natural and social insertions. Since Hegel and Romanticism, contemporary philosophy and thought have sought to understand literature as a form of consciousness that, with the aid of imagination, leads to human self-knowledge in both its individual and collective dimensions. The book contributes to new material relationships between literature and philosophy, both at the academic and political levels, in both disciplines. It also develops key notions about theory and practice, as well as theoretical and political discussions and debates between the different disciplines on contemporary theory.

New Directions in Philosophy and Literature is a book that explores intensively the turns and tensions that have constituted the crossroads between literature and philosophy. The book is an exhaustive work in which the reader can discover new perspectives and debates that are significant for literary studies, the theories of post-humanism and new materialisms. The editors David Rudrum, Ridvan Askin, and Frida Beckman aim at "hop[ing] that the collection succeeds in both acknowledging and encouraging new ways of configuring the relationships between literature and philosophy, broadly conceived." (p.1)

The relationship between literature and philosophy starts with the origin of both disciplines themselves. From the transition from myth to logos to the current logical hegemonic of knowledge, literary studies and philosophy have remained close, but separate at the same time. Nevertheless, as David Rudrum writes "In the early twenty-first century, however, debates around modernity, postmodernity, and postmodernism have subsided, and there seems to be a pervasive acceptance that the postmodern moment has come to an end" (p.19). For this reason, this book questions this relationship and proposes alternatives to think from multiple (others) perspectives. This book is an example of how new materialisms, post-humanism and speculative fiction, open multiple ways to rethink and represent the worlds, the fields, the stories and the words. It provides elastic possibilities for literature and philosophy.

The book is divided into six sections, preceded by a genealogical introduction written by Claire Colebrook. The different sections allow and invite the reader to discover tools and stories to recognize and promote new ways of shaping the relationships between literature and philosophy. These relationships are based on a transversal thread, a constant intra-action (Barad, 2007) established between both disciplines, which, far from perpetuating its distinctions, presents a field full of possibilities. As a starting point, the desire to conceptualise what comes "after" postmodernity is presented, as well as the meanings that surround the post-human, the new materialisms, the concept of the Anthropocene and biopolitical philosophy. In the introduction, Claire Colebrook presents the development of the parallel study of philosophy and literature that took place during the 20th century, and the point of view explored in the 19th century. She opens multiple narratives that move from the particular to the infinite, from the micro to the macro, from the multiple structures of functioning to the expansion of possibilities and tensions. As Colebrook explains:

> Not only is philosophy never at peace with itself, philosophy's ongoing internal tension is bound up with its ongoing difference and complicity with literature. This is primarily because both literature and philosophy are bound up with a system of language that both enterprises seek to save from everyday banality for the sake of everyday richness. (p.4)

It articulates its reflection around the continuous negotiation that exists between the representation of the forms of the world together with its own renewal. And it is precisely this negotiation that transcends the relationship between philosophy and literature.

To continue, in the first part, titled "Beyond the Postmodern: Literature, Philosophy, and the Question of the Contemporary" (p.19), the authors explore how the contribution between philosophical and literary perspectives analyses and dialogues with the particularities of the wake of postmodernism. The different chapters of this section reflect on the characteristics of this contemporaneity; as well as on the trends underlying current aesthetic issues, and on the task of finding a new name for the present. This section addresses the concerns that these limitations open up in the current debate on the potentialities of the non-human in literary construction.

A challenge within literary theory and philosophy would be, as explored in this volume, to admit that it is not necessary to limit the proliferation of narratives and theories that try to account for the world and its existence but to explore and recognize the intimate overlap between knowledge and creation. As explained in the editors' Preface "More traditional forms of analytic thought have been enriched as the insights of ordinary language philosophy have engaged in a dialogue with literary criticism, to the benefit of both disciplines" (p.1). Throughout the book, there are examples of how philosophy and literature do not stop sharing questions and concerns about the world we inhabit. After all, it is a matter of observing how literature provokes philosophy as much as it can become an object of fiction and literary creation.

The second and third parts raise the tensions and possibilities around two related displacements; a) the encounter between the human and the non-human, b) the object-oriented philosophy and different ways, to go beyond the subject. Along with the four chapters of the second part "Beyond the Subject: Posthuman and Nonhuman Literary Criticism" (p.99), we find a determination to theorise beyond human subjectivity. For example, in the first chapter in part 2 Brigit Mara Kaiser postulates how Cixous' post-structuralism marks the beginning of a turn towards the relationship between the material and the embodied, as well as in the encounter between human and non-human agents that would later be consolidated. She highlights precisely how,

"Cixous's engagement with subjectivity debunks traditional Western humanist conceptions of the Subject that are based on human exceptionalism and rationality as its anchor-points" (Kaiser, p.104), and then rely on the entanglements of the affective, the immaterial and the non-human to trace different foundations instead.

The third part, "Beyond the Object: Reading Literature through Actor-Network Theory, Object-Oriented Philosophy, and the New Materialisms" (p.175), is an explanation of how these theories are used in the study of literature or how the study of literature can help to understand or even develop the theories themselves. All chapters in this section explore alternatives to the traditional subject-object binomial. They all examine how these alternatives are developed in conjunction with the many forms of literature. An example of this to be highlighted is the chapter "A Field of Heteronyms and Homonyms: New Materialism, Speculative Fabulation, and Wor(l)ding" by Helen Palmer (p. 215). The author gives us a new materialistic reading of speculative fiction, particularly recent Afrofuturist literature. Understanding and relating to the process of wor(l)ding "as a process of construction of the discursive-material world" (Haraway, 2016, p.13). It exposes the fundamental interweaving between matter, the discursive and the semiotic, dialoguing with Haraway and Barad. The author maps "The Field" as an unstable and enabling place (p.217). The Field is a challenge not only for literature or philosophy but also for research since it is articulated as an enabling space.

The turns, tensions and displacements that open up between and from philosophy and literature would not be entirely possible without rethinking the channel that transports them; language. The problem of words and things is the questioning of whether there is indeed a correspondence between things that are in themselves and how we name them.

There is a legitimate correspondence between words and things. This question is extensively articulated in the fourth part of the book titled "Ordinary Language Criticism: Reading Literature through Anglo-American Philosophy" (p.255). The authors address the question of how the critique of ordinary language is not a literary theory, but rather a style of thought, or a way of working with language and texts. This relationship with linguistics and the challenges of the new approaches to linguistic

criticism allow for the exploration and creation of (literary) worlds in which to rethink the materialities, ethics and politics that take place in The Field.

The fifth part of the collection, entitled "The Incarnation as Ethics": Literature and Life in the Anthropocene" (p.317) includes four chapters that explore the ethical and conceptual challenges of philosophy and literature in the Anthropocene era. Precisely, another valuable insight of this volume consists in how we relate to literature as a mode of research in itself. An investigation that is based on a political commitment. The concern for the destructive effect of the human species and the care of the environment (nature) is not new, nor in philosophy, nor literature. This section provides some brushstrokes in the construction of new ethics for new challenges (Haraway, 1988), and in this part, we find the contribution of Adrian Parr with "So to Speak" (p. 382). It is a fundamental and interesting contribution on how to denounce the injustices of the environmental crisis in an exclusively secular way. Poetically Parr reminds us of the need to continue exploring and investigating how literature allows us to rediscover and relate to each other in a changing world. This relates to the thesis of the last section of the volume "Politics after Discipline" (p.391). It begins with King Chow's contribution, where the author questions how literature is trapped in biopolitical conditioning, situating it as an academic field inseparable from the context of biopolitics, which also involves the university as an institution itself in the non-renewal of language. Both the above mentioned and the contribution of other authors such as Frida Beckman (one of the editors) and Charlie Blake, represent an impeccable genealogy for analysis on how the political structures of control intrinsically affect the modes and topics of literature.

In conclusion, *New Directions in Philosophy and Literature* is an exhaustive work to situate necessary issues in the fields of philosophy and literary studies. It explores fundamental questions that have to do with epistemology and with the absolute and, at the same time, long-standing need for holistic and organized approaches to such a complex and difficult social context. In that sense, when the variety of events, processes and situations is so wide, only the theories that are capable of organizing a systemic and, at the same time, integrated vision, can be useful. After all, both, philosophy and literature, are attempts to understand a world whose meaning is not

given to us beforehand. Yet we name things; we make theories and stories about reality without knowing for sure whether we are getting close to its "true" form, yet in the very act of naming it, it moves away just because it is named. The focus of the questions raised throughout the sections of this book is the idea that literature, philosophy, science and their multiple intersections generate thought using different tools and means that overlap.

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Review of the book: Derrida after the End of Writing. Political Theology and New Materialism, Perspectives in Continental Philosophy (Crockett, Clayton, 2018)

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The intention of this book is not to provide a detailed exposition of Derrida's deconstructionist philosophy, but rather to move, through Derrida's late writings, towards new philosophical horizons such as speculative realism, OOO (object-oriented-ontology) and new materialism. This text consists of eight chapters. Each of them would deserve a long discussion because of the vastness of topics and references Crockett touches upon. To sum up the aims of this book, we can say that Crockett understands Derrida's later philosophy from a new materialist perspective that deals with religion, ethics and politics albeit he never used the term "materialism". In doing so, the author enriches Derrida's reflections with various interactions of other authors who have contributed to and influenced the Algerian philosopher's thought. There are constant references to the continental hermeneutic-phenomenological tradition of Husserl, Heidegger, Sartre, Levinas. But there is also a comparison with contemporary authors who push Derrida even further, such as Malabou, Meilassoux, Morton and Barad. Thus, I would like to focus on the seventh and eighth chapters, in which Crockett offers an innovative interpretation of Derrida's thought from a new materialist perspective dealing with Malabou's biological materialism and Barad's quantum physical materialism. These authors help us to read deconstruction as a form of materialism, offering a framework within which Sciences and Humanities can interact and cooperate.

The new materialism is a matter of energy; or better, it is a new way of conceiving energy, on the one hand, renouncing to outline it as a sterile empiricism of pure

difference and, on the other hand, pulling it out of a simple deterministic and mechanistic ground. This new materialism is to be configured as a transit of energy, as a dynamic system of dissipative structures. Energy is entirely material and spiritual and delineates a monist framework that does not, however, renounce transformation, qualitative mutation and the pluralism of emerging properties. This new materialism offers resources to think about matter in a dynamic and relational sense and not in a static, reductionist and atomistic way. According to Crockett,

> Derrida certainly kept a critical distance from materialism; he does not use this term in a positive sense. At the same time, I think that the non-reductionist materialism expressed in terms of New Materialism offers important tools to understand Derrida. In some ways, I am appropriating Derrida as a new materialist, but I don't think that deconstruction proscribes such an entanglement. (2018, p. 8)

In the seventh chapter, Crockett deeply analyzes Malabou's notion of plasticity in connection with writing: the shift from writing to plasticity is a change consonant with the new materialisms insofar as it emphasizes the self-organizing, adaptive aspects of matter itself as a paradigm by which to overcome long-held constructed binaries between nature and culture, human and nonhuman. In this sense, plasticity allows us to see the event in the mechanism, the spirit in the material, without it thereby ceasing to be material. The concept of plasticity is extremely dialectic since, on the one hand, it embodies the essence in malleable and material forms and, on the other, it allows the schema to be identified in a series of material embodiments. With Malabou's words, "plasticity appears as a process where the universal and the particular mutually inform one another, and their joint outcome is that particularity called the exemplary individual" (2004, p. 13). Thus, the notion of plasticity outlines a biological materialism by emphasizing forms, understood as theoretical frameworks which straddle several research fields and highlight the embodied, embedded, relational and affective interconnections across human and non-human entities. On this, this book is a perfect example of the relational nature of knowledge, as it delves into various fields of research, from biology to religion, from politics to quantum physics.

> Derrida works with and through the paradoxical tension between the machinic repetition and the singular dignity of life as ethical responsibility to the other, whereas Malabou wants to unify both in her conception of plasticity. Derrida's later work thus appears more ungrounded, and he would resist adopting Malabou's characterization of this new motor scheme, but her idea of plasticity gives us a vantage point from which to make Derrida's philosophy more coherent, even if it betrays some of the letter of his writings. (2018, p. 112)

Plasticity involves both the capacity to receive form and the capacity to give form and takes place between shaping of form and destruction of that form itself. Destruction of form is an intrinsic part of the process of formation: plasticity is destructive, but this destructive nature of plasticity is not simply negative. Therefore, it is also metamorphic.

In the eight chapter, Crockett deals with Karen Barad's perspective, entangling philosophy with quantum physics. As Crokett says,

> my turn to the work of Karen Barad here is not meant to invalidate the significance of biology or to undermine the importance of Malabou's philosophy, but to offer another displacement, a nontransferential clinic of quantum physics where a quantum Derrida operates. (2018, p. 121)

The meeting point between Crockett's interpretation of Derrida and Barad's philosophy of science lies in the fact that Crockett believes that "writing has to do with spacing, deferral, and delay and so it is what prevents full self- presence" (2018, p. 17) and, at the same time, Barad thinks that "there is a deep sense in which we can understand diffraction patterns - as patterns of difference that make a difference - to be the fundamental constituents that make up the world" (2007, p. 72). Barad uses Derrida's philosophy to make sense of reality at the subatomic level. In fact, like *différance*, quantum field theory involves both the dynamic temporization of time and space and

a dynamic deferral as polemical opposition to identity because it involves the creation and destruction of virtual particles, which extends to take into account all of reality. Barad calls this movement diffraction: in this process waves meet and interact, forming new entities.

> She argues that Derrida's philosophy offers a better way to understand this situation than many of the interpretations supplied by quantum physicists. Words, concepts, phenomena are entangled in complex ways, and deconstruction attends to the manner in which such phenomena are spookily entangled. This is a materialism of a sort, but a very strange kind of materialism, that Barad calls a hauntological materialism. Our entangled intra-actions as large slow beings repeat in a different way the relations among subatomic particles. We come to face our past lives and previous historical figures as ghosts, exerting a hauntological influence on the present. (2018, p. 130)

The world, Barad states, is an open process of mattering through which mattering itself acquires meaning and form through the realization of different agential possibilities. For this reason, "reality is therefore not a fixed essence. *Reality is an ongoing dynamic of intra-activity*. To assert that reality is made up of phenomena is not to invoke one or another form of idealism. On the contrary, phenomena are specific material configurations of the world" (2007, p. 206). Objects are not static things, but dynamic processes that change in their interaction and intra-action with other objects: dynamics is not what happens between things, but how these things become what they are as they transform themselves and their objects in a mutual asymmetrical process of materialization. Even if Barad does not mention Derrida in her book, she develops her notion of diffraction in a manner strikingly similar to the Derridean *différance* since diffraction is an ethico-onto-epistemological matter. According to Barad,

> we are not merely differently situated in the world; "each of us" is part of the intra-active ongoing articulation of the world in its differential mattering.

> Diffraction is a material-discursive phenomenon that challenges the presumed inherent separability of subject and object, nature and culture, fact and value, human and nonhuman, organic and inorganic, epistemology and ontology, materiality and discursivity. (2007, p. 381)

In conclusion, this book is an important contribution to a re-reading of Derrida's thought in a new materialistic perspective and offers ideas for expanding his philosophy to a relational ontology of differences that remains faithful in some respects to the legacy of deconstruction. This proposal develops a plurality of alternative paths to the usual theological and political interpretations of Derrida's thought, reconfiguring Derrida's philosophy in a scientific context, close to quantum physics and biology. As the author himself states, "*There is no proper Derrida*, but there are more interesting, relevant, and compelling iterations of Derrida's thought" (2018, p.138)

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Rocco Monti is a MA graduate philosophy student at University of Milan. He wrote his MA thesis on Josiah Royce's and Charles S. Peirce's pragmatism, focusing his research on the concept of experience and the role of practices of interpretation. His areas of research concern pragmatism (Charles S. Peirce, Josiah Royce, John Dewey) and phenomenology (Edmund Husserl, Jacques Derrida). His approach seeks to integrate these two perspectives by highlighting their points of contact and elements of difference. He is currently working on the concept of vagueness (in particular in Peirce's semiotics), trying to understand how it can interact with Royce's ethical and social philosophy and how it can help to think about the genesis and articulation of values.

Embodied Knowledge of/with the place.
Review of the book: Placemaking, A New Materialist Theory of Pedagogy (Page, Tara, 2020)

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Reviewing Tara Page's book, Placemaking, A New Materialist Theory of Pedagogy for Matter: Journal of New Materialist Research, specifically its section Affecting Affirmative Reviews, was an affective and material placemaking journey(ing). Taking new materialist thinking and doing, Page explores how we make and learn place through the entanglements of body with the socio-materiality of place-world. Page's book is an invitation to a journey of placemaking, with the children of a particular place-world, the Australian Bush, and with Page, herself, an Australian artist scholar based in London. The reader learns and makes place with Land and Bush alongside Page and her human and more-than-human participants. Through a series of images, Page's embodied and embedded experiences of the Bush, walking with children in their everyday placemaking practices, show us how learning, knowing and becoming happen through the intra-action of bodies of humans, the Land, Bush, dirt, rain, clouds, their colour, texture, sounds, tastes and feelings.

We learn and know about Page's child participants of the Land, Bush world-place, through their bodily 'with-ness' (Whitehead, 1978) with the socio-material place-world. Page replaces the 'of the' with 'with' in thinking through bodies and place to suggest that placemaking practices are not an either/or relationship but rather a 'with' relationship as part of who we are and how we become. The 'bush kids' know and learn the 'matter of factness' of life and death through the embodied knowledge of the matter of rain, dirt, drought, climate, mud, cattle, sheep, smells and distance and time to travel to facilities and services. Reading this book in itself is a placemaking

experience that emerges through entanglements with some fundamental new materialist concepts and theories, thinking with them in practice to know and learn about the Australian Bush.

Instead of representing place as an object or an inert background Page shows us, through various voices and mediums, images, poems and films, how we know our place-worlds, making and learning place through socio-material embodied entanglements with place. Through placemaking with the children of the Bush she offers the reader the idea of being owned by the Land rather than owning the Land. However, her search for a 'sense of place', in an increasingly 'placeless' or non-place-world, does not suggest a sense of fixity in place. Instead, as a nomad migrant Australian researcher living in London and encountering the question of 'Where are you from?' in her own placemaking experiences, she embodies placeless-ness when in London, as she still carries within her the place where she grew up. Page's nomadic journey, being and becoming with Australia, London and the Land, living and researching here and there, reminds us that those places and bodies in Australia that she explains in her book are categorized as 'remote', 'the outback', places where you may not see another human for days and you only go to visit, but not to live. For Page, these places and how they are identified linguistically within the state and media have a vital role in pedagogies of national identity and nationhood discourse.

Through her series of images, films, stories, poems, paintings and journeying, we learn that what Page wishes to share with us does not describe the subject or the object; she talks, for instance, of the tractor or the trees but she is recalling their entanglements, the event and the action between them. Page's approach enables us to entangle with the Land, the Bush and the world-place of the 'bush kids' through researcher chosen media and research. In this placemaking and mattering at times we walk on dirt and follow tracks on dry land; at another we focus on land, flora, fauna, the light and climate. Through these entangled embodied knowledges of place, Page argues for moving beyond Newton's, Descartes' and Locke's progressive mathematisation of nature that dismiss the qualitative characteristics of place.

Instead, she invites us to be more attentive to colour, texture, smell, sound and other sensory qualities that can differentiate place/s.

Page's contribution is an 'onto-ethico-epistemological' (Barad, 2007) one, that not only entangles us with various vital concepts of new materialism and how it ontologically shifts our thinking about belonging, place, matter, perception, body, pedagogy, research and care, but also at an epistemological level how it can use different ways of knowing and learning other than the visual or textual. As a PhD student who draws on new materialism using walking and photo-diary making, I found this latter approach in Page's book very significant. For her, we learn and know placemaking through embodied pedagogies and their entanglements with socio-material practices of the place-world. These embodied pedagogies occur everywhere with the embodied knowledge of the matters of human and more-than-human bodies, not just in the classroom. Body, Land and Bush can then be understood as the intra-actions of socio-material-spiritual-embodied practices, knowledges and pedagogies.

Her book is an important example of this pivotal new materialist premise of 'thinking through theory in practice' (Jackson and Mazzei, 2012), rejecting dualistic separations of mind from body and of nature from culture, questioning how matter comes to matter, the intra-actions of matter with bodies and of making with thinking. Page shows us how going beyond the usual enables sharing the unseen, the fleeting and the felt experiences. In doing this, she listens, occasionally questions, observes but always actively engages in children's everyday placemaking practices as they move through and intra-act with the socio-materiality of the place-world. She uses making rather than taking when she refers to film and photography, to reframe/remake these practices away from representations or illustrations of reality/truth to 'making'. As an artist researcher, Page herself is a maker more than a taker as she methodologically provides the capacities for other ways of knowing and learning to happen in her thinking and doing practices.

Page's book is a vital contribution to learning how placemaking practices and pedagogies matter not only in who we become and how we know the world, but also in being with the world and making the world-place 'with' care.

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