Cecilia Åsberg · Rosi Braidotti *Editors*

A Feminist Companion to the Posthumanities

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ISBN 978-3-319-62138-8 ISBN 978-3-319-62140-1 (eBook)
https://doi.org/10.1007/978-3-319-62140-1

Library of Congress Control Number: 2018941564

Printed on acid-free paper

This Springer imprint is published by Springer Nature
The registered company is Springer International Publishing AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Acknowledgement

Feminist posthumanities are the practices of making new connections. This does not mean getting rid of the previous ones, but refiguring them in new constellations. The book started out from such very theory-practice based grounds and feminist community building activities at The Posthumanities Hub, Tema Genus, Linköping University and Centre for the Humanities, Utrecht University. This volume has gained volume, muscle mass, and it has been generated and exercised through several feminist relationships and posthumanities networks, active across different locations, generations and situations. Now, finally it can walk on all eight.

This mutant creature, spidery and webbed, was made possible through the continuous support and hard work of all the involved authors. Thank you all so much! However, there are a few people we would like to especially warmly thank, and that is Marietta Radomska, for amazing coordinative skills, multiple readings, and an incredible eye for detail at the end of a very long process, Lauren LaFauci, for steadfast readings and re-readings of the introduction, Redi Koobak, for her cunning copy-editing, Tara Mehrabi, for her daunting work of abridging the classical piece by Karen Barad, Goda Klumbyte, for rock-star and professional competences that always go way off the chart, and Toa Maes, who at the mid stage did a fabulous job. And last but not least, warm thanks to Vera Weetzel who gave the volume a wonderful finishing touch. Huge thanks goes to Iris van der Tuin and Ericka Johnson for whip-smart review comments and stead-fast support. Thanks to all the great people at The Posthumanities Hub and Tema Genus in Sweden, and the wonderful team of the Centre for Humanities in the Netherlands!

Cecilia: A very special thanks and all my love goes to my young daughter Elsa (full name, always under revision, includes Åsa, Frozen Elsa, Elisabeth, Crocodilia, Bamse-Barbie, Techna, Musa, Blomma, Blada and Olof), my dear friends, family and life-support systems: Erik, Marietta, Lauren, Olga, Nina, Lina and Björn, mum Åsa and dad Jan, Louise and Therese, Iris and Ericka, and of course Nisse, the cat, who taught me more than a few tricks of species companionship.

Last but not least, we would like to acknowledge the support of the Swedish Foundation for the Humanities and Social Sciences, funding our meetings in

PIN—Posthumanities International Network—with Matthew Fuller, Luciana Parisi, Olga Goriunova and ourselves; The European Research Council (ERC StG) for "Prescriptive prescriptions: Pharmaceuticals and 'Healthy' Subjectivities" with Ericka Johnson (pi), Celia Roberts, Cecilia Åsberg and their PPPHS-students; MISTRA and Formas for supporting The Seed Box: An Environmental Humanities Collaboratory, The Social Sciences and Humanities Research Council of Canada for funding The Posthuman Research Network (pi Christine Daigle), and The Swedish Research Council, funding Posthumanities Network: Next Generation with Norwegian, Canadian, Dutch, US-American and Swedish participants.

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Chapter 1
Feminist Posthumanities: An Introduction

Cecilia Åsberg and Rosi Braidotti

Human nature is not the oxymoron we imagined it to be. In this new planetary age of the Anthropocene, defined by human-induced climatic, biological, and even geological transformations, we humans are fully in nature. And nature is fully in us. This was, of course, always the case, but it is more conspicuously so now than ever before: people are entangled in co-constitutive relationships with nature and the environment, with other animals and organisms, with medicine and technology, with science and epistemic politics. We live and die, play, thrive, and suffer by each other. Now is the time for greater scholarly attentiveness to such human and more-than-human worlds in sociocultural research, saturated as they are with ethical and political implications (van Dooren et al. 2016). For example, think of "mad cow" disease, where humans feeding cows with by-products from slaughtered sheep infected with the prionic disorder "scrapie" in turn generates prion disorders in cows that get transmitted to human beef consumers through a series of transcorporeal (Alaimo 2010) gestures across species. We can think, too, of pollen allergies and their increased prevalence, or how hormone-like substances seep from plastics into infants as well as into fish bodies, which we in turn ingest, awaiting potential biochemical surprises. All these are mundane instances of environed embodiment, where science needs to meet cultural knowledge on values, sense-making, politics and purpose, and where the humanities and social sciences meets postnatural nature (Åsberg 2018). While culture and nature never were in fact separated (Haraway 1988; Shiva 1988; Latour 1993), we live in a time when the "slow violence" (Nixon 2011) of these relationships of embodied environments and environed embodiments appear to us more clearly.

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_1

These relationships seem to us, the feminist editors of this volume, more acutely relevant than ever: that is, nature seems humanized – and human cultures naturalized – in new, often unhealthy, ways. The intra-academic term for our time, the "Anthropocene," has come to stand in for many of these interdependencies and relations (Yusoff and Gabrys 2011; Gunaratnam and Clark 2012; Neimanis et al. 2015). At the brink of mass extinctions, including our own, we need to change our ways – or die trying.

It is high time for versatile research practices that can account for such a human and more-than-human situation, a kind of perfect storm of intermingled human and nonhuman forces. One not too far-fetched example of such forceful entanglements, and the urgency for humanities and social science scholars to take them seriously, is how the human-induced planetary climate changes manifested in a severe and extended draught period in Syria, priming for the mayhem of the civil war and its flux of refugees (Kelley et al. 2015). Similarly, the forces of naturecultures frequently become dubious and damaging, such as when we regard "Culture" as an external force of God-like artificiality, when we still debate if women should get human rights, or when we regard less than strictly hetero-normative sexual practices as *unnatural*, or when all kinds of socio-historical inequities get legitimized by scientific authorities (Thornham 2000; Braidotti 2005; Kirby 2008; Roberts 2007; Hird and Roberts 2011; Åsberg and Mehrabi 2016).

We simply can no longer stand for the modern divide of nonhuman and human, nature and culture, and we can no longer up-hold the division of labour where "nature" is left to science and "culture" to the humanities. C.P. Snow's famous, but highly insufficient, thesis of the "Two Cultures" however influential, can no longer be allowed to vaguely guide us. Even less should it entrench us in critiques of relativism, political correctness, identity politics and all-too-human humanism *vis-á-vis* positivism, reductionist scientism or biological determinisms. This modern divide (Latour 1993) of culture from nature follows on a long intellectual tradition of European thinking that separates and asymmetrically orders thought and praxis. It is a divide that plays out differently; it bifurcates, meanders and dovetails into a subset of other violent hierarchies, such as wild/civilized, or Universal Man *vis-á-vis* women, natives, queers, animals, and other Earth Others at large (Shiva 1988; Plumwood 1993; Bryld and Lykke 2000). Ontologically, the world we inhabit is not bifurcated in this simplistic manner. Consequentially, we need ethical research practices and epistemologies that dare step out of disciplinary comfort zones while they stay true to demands on local accountability (Rich 1984), to our own natureculture complicity (Haraway 2016), and to a worldly feminist politics of conviviality today (Heise 2016). It is, we argue, high time for multivalent forms of feminist posthumanities.

As we delineate in the following, the fields of feminist posthumanities draws on multiple sources of thought, creative practice, art, science, and various minoritarian areas of study. This allows us not so much to take back the past of the humanities as open it up to a wider agenda. For example, feminist creators like Octavia Butler, Ursula Le Guin, Lynn Randolph, Barbara Bolt, Monika Bakke, Perdita Philips, Kathy High, Basia Irland, Katja Aglert, Janna Holmstedt, and

many other creative scholar-artists, weave scholarly kinship relations with art and imagination as their engine of discovery and "alter-worlding" device. Another example, the posthumanist flows of phenomenologist Astrida Neimanis (this volume) points out just how much potential such affirmative approaches may encapsulate (Neimanis 2017). Similarly, the materialist scholarship and community-building, poetics, musicology, social media presence and artwork of Barbara Bolt, Matthew Fuller, Lissa Holloway-Attaway and Milla Tianen, also in this volume, draw visionary energy from the arts as well as from deep-seated and richly embedded empirical cases, media politics, and intra-personal, critical entanglements with natureculture (Wilson 2004), bioart philosophies (Radomska 2016), and unexpected encounters with the wild (Plumwood 2012). Such work brings in important ways together newer and more veneered communities of scholars in technoscience studies, cultural studies and philosophy to flesh out and theorize contemporary subjectivity and collective agency (cf. Hellstrand 2017). These fields of research revise and reframe our posthuman imaginaries for the purpose of learning to get on better together (cf. Neimanis, Åsberg & Hedrén 2015; Cielemęcka 2015; Sjögren 2016). That is, in the feminist registers these authors bring attention to embodied subjectivity, sexuality (see Patricia MacCormack this volume), temporality (see Christina Fredengren this volume), dis/ability (see Donna MacCormack this volume), to death and dying (Lykke 2015; Mehrabi 2016), to queer nonhumans and dark ecologies (Hird and Roberts 2011, Henriksen and Radomska 2016; Morton 2016), to the vivacities and limitations of whole ways of life, and the materializing structures of our planetary politics and its contradictions. Shunning chronological progress narratives at large, feminist posthumanities may tap into the process ontology of Heraclites as much as to the fundamental critiques of new materialisms (van der Tuin 2011a, b, 2015), join monster networks, laboratories, as well as #metoo movements. There is no shortage of arenas.

In academically irreverent, yet extremely rigorous, attentive and demanding, practices of scholarly investigation, feminist posthumanities brings things together, new stories and modes of worldly relationality, allowing for their reconfigurations and reconstitutions. For instance, it may trace back to the early anti-humanists (i.e. Foucault 1970), existential feminists such as Simone de Beauvoir, and other scholars who severely questioned humanity in the aftermath of the European holocaust. They questioned the universal role, mastery, and nature of "human nature" itself. Following first the postmodern twists and kinks to feminist epistemology (Scott 1996), and then inaugurating through new feminist materialisms the return of ethics and ontology six decades after the Second World War, feminist posthumanities taps into these and many other genealogies at once. For instance, it draws in important ways on the set of iconic philosophers (Derrida, Lyotard, Deleuze, de Beauvoir, Irigaray, Cixous, and others), that peeled back the layers of rationality and exceptionalism that characterized the human subject (Lloyd 1984) and its adjacent rule of logocentrism. A particular starting point may be traced to Michel Foucault, who questioned the figure of the "human" around which the humanities was built (Foucault 1980). Foucaultian readings affords an understanding of how the very narrow take on the human of the humanities legitimized exclusionary and derogatory social practices, phallogocentrism,

eurocentric cultural imperialism, and ecological exploitation by way of academic credentials. As a counter-measure to such *all-too-human humanities*, feminist posthumanities works almost the other way around, by inclusionary and non-reductive, yet targeted, practices of attentive consideration. Such analytics are forged transversally in knowledge conversations at various crossroads of human and nonhuman co-constitution. And there need be no firm identity to 'feminist' posthumanities, only an acknowledgment to this rich ouevre and the ways in which such critical theories have worked transversally, and helped effect a jamming of the theoretical machinery in asserting the existence of excluded others of the humanities.

Beyond the Humanist Imagination

The life sciences, and what we learn about ourselves from daily up-takes of circulating technoscientific imaginaries, remain a great inspiration to feminist posthumanities. In spectacular claims, internet memes, alarming news and science popularizations we read about the technological next steps of human evolution, social media augmentation or individualized drug developments. Such science stories exist today parallel to reports on overwhelming amounts of e-waste, loneliness, or news on how common plastics seep hormone derivatives into newborn bodies. All such stories need critical and creative re-appraisals for what they entail in an entangled world of contingency and uncertainty. Mutualisms and ambiguities at all levels demand well-rounded cartographies and immersive analyses with an eye to the critical and creative concerns of how to live well with multiple others on this planet (Braidotti 2005, 2016). Feminist posthumanities, we argue with this volume, offer starting points for ethical approaches and analytical abilities to engage with contingent entanglements and multiple others.

Ambiguities abound today. From the Latin *ambiguitas*, meaning paradox or uncertainty, the adjective ambiguous signals the changeable, uncertain, disputed and obscure qualities of contemporary life. For instance, we may in everyday media read about minimalist lifestyles featuring trendy "green" consumption at costly prices and about domestic practices of "decluttering" that, paradoxically, adds significantly to the massive amounts of waste in urban settings. Threats of invasive species, or global species mobility at large (some afforded by the transgenics biotech industry and transfers between man-made lab species or by anthropogenic climate effects) go next to feared new pandemics lurking on a global scale from melting permafrost, make-shift hobby labs and super-medicalized breeding practices in farming and animal husbandry. Perceived threats trigger wars of all kinds and denominations – including the oxymoronic "humanitarian" ones – and spread their own toxic side effects, triggering diasporas and exodi at a fast-growing pace. Refugees flee scorched or flooded lands only to meet European fences, cameras, and new forms of surveillance; an isolated volcano can halt northern air traffic for months while legislations on ecocide lag tragically behind due to inabilities to appreciate nonhuman agency. In the affluent parts of the

world, exceptional cleaning practices and anti-bacterial products seem to have paved the way for new allergies and auto-immune responses. At the same time, biologists map the microbiomes, the sum of our microbial genetics, revealing in a news flash the bacterial agency and supremacy over the so-called *human* body. Indeed, more than 15 years have passed since the "human genome" – hailed as the map to our own species and self-understanding – itself turned out to be a predominately multi-species affair (Åsberg 2005; Holmberg 2005). The life sciences have since developed advanced transgenic technologies for targeting human disorders in nonhuman animal bodies while behavioral biologists and ecologists have documented a range of almost human-like affective and communicative registers, like empathy or intelligence, in nonhuman animals. In short, the climate sciences and the life sciences seems to complement many well-established poststructuralist efforts to deconstruct the solid and autonomous human individual. Now, the tasks of the more-than-human humanities scholar are then to provide guiding stories with which to tell these stories, and to present adequate maps to the specifically situated historical locations.

The all-pervasive aspects of our technoscientific existence, that there is no unsurveilled spot on this globe and no body unaltered by modern life, underpin what we may see as both our posthuman and postnatural condition. Presently, our collective imagination manifested in popular cultures also complements a humanistic critique. Many urban, highly educated, and privileged people seem for instance increasingly taken by two significant cultural genres. The first is dystopian television series about the fall of white men, often featuring flawed (or even sociopathic) male characters who go to extremes to keep up the appearance of being functional. The white male figures in *Mad Men, Breaking Bad, Dexter, House of Cards* come to mind. The second cultural genre is apocalyptic horror and dark science fiction films such as *Blade Runner 2049, Alien Resurrection, Resident Evil*, *Annihilation,* and those of the *X-Men* or *Marvel* franchise. Replicants, hybrids, monsters, mutants, clones, robots, and alien invaders constitute trans-species alliances or transversal assemblages that confront and challenge the received standards of normality, naturalness and propriety. These films seem to portend new forms of posthumanity emerging in none-too-distant futures. Both genres suggest that the contemporary social imaginary is clearly techno-terratological (Braidotti 2002; Potter and Hawkins 2009). Dystopian climate futures that brings modern life back to natural history and ponders the evolutionary or reproductive consequences of human actions and humanistic politics are seen in television mini-series like *Fortitude* or in the feminist literatures of Margaret Atwood (*Oryx and Crake, A Handmaid's Tale*) or Ursula Le Guin (*The Word for World is Forest*). Utopian experimentations with lived relationality, sensory enhanced forms of sociality and sense of belonging are also attempted in series like *Sense8*, testing the grounds for posthuman connectivity. Clearly, from the overlapping domains of science and popular imagination we have already moved way beyond the limitations of the humanist imagination, for better and for worse. Despite the somewhat bipolar reports -either utopian or dystopian, technophobic or technophilic, – we dream, live and enliven already the posthuman condition. Now we need more than ever the story telling practices accountable for its politics.

Cultural Studies and Feminist Science Studies After the Human

What the emergence of Cultural Studies did for the societal relevance of cultural critique and anti-elitist imagination in the 1970s, we need to do all over again today. But this time we need it in a post-constructionist *modus operandi* of wordly immersion. As we have seen since, the planetary parameters have shifted significantly. We need now urgently to deploy both our more specialized analytical tools and a much wider scope in our approach to the entanglements of nature and culture – what Haraway termed "naturecultures" – and their all-over emerging ecologies (Kirksey 2015).

This volume argues that we need to not just move beyond the humanist imagination, but that we also need better tools to deal with its lived realities. That means also that we need to see human imagination not as external to the object of study, but as *actively producing it* (Åsberg et al. 2011; Yusoff and Gabrys 2011). New materialist and posthuman feminist philosophers can help us make this shift. Revisiting Spinoza with Deleuze, they have argued for the radically immanent (Braidotti 2006) and politically generative (Gatens and Lloyd 1999) force of the imagination. Moreover, materialist imaginaries are also points of reference for ongoing processes of identification and disidentification, crucial for subject formations, educational practices and politics at large, as theorized by Nina Lykke and Hillevi Lenz taguchi (both in this volume). As will be evidenced in the unique and multivalent contributions of this book, feminist posthumanities troubles the very idea of self-referential starting points in the human, humane, or in the humanities discipline. An iconic introduction to posthuman performativity and the feminist focus on mutualistic relationships of becoming, matter and meaning, is in this volume proudly afforded by an abridged version of Karen Barad's groundbreaking 2003 article from the journal *Signs*. Feminist posthumanities remain in that sense anti-foundationalist (Braidotti 2005, 2013) and non-teleological while being through-and-through "matter-realist" (Kember 2003), embedded and embodied, local and situated (Braidotti 1994). Indeed, in this rich volume, we see how the historiographies of various forms of wordly posthumanities have met up with a diverse range of feminist scholars engaged with a wide array of epistemological, ontological, ethical and political questions.

For some time, feminist philosophers and scholars of science studies and cultural studies, like Braidotti, Hayles and Barad, have deployed the notion of the posthuman to imaginatively link politics and subjectivity. They have done so in order to break or otherwise overcome the fixed, dyadic, and hierarchical categories of nature and culture, or the human and the nonhuman, thereby enabling alternative analyses that explore the entanglements and mutual co-constitutions that result. For Karen Barad, "posthumanism marks a refusal to take the distinction between 'human' and 'nonhuman' for granted, and to found analysis on this presumably fixed and inherent set of categories" (Barad 2007, 32). For N. Katherine Hayles, the posthuman signals both a problem and a possibility:

> If my nightmare is a culture inhabited by posthumans who regard their bodies as fashion accessories rather than the ground of being, my dream is a version of the posthuman that embraces the possibilities of information technologies without being seduced by fantasies of unlimited power and disembodied immortality, that recognizes and celebrates finitude

> as a condition of human being, and that understands human life is embedded in a material world of great complexity, one on which we depend for our continued survival (1999, 5).

The posthuman spectrum entails thus both problems and possibilities for feminist materialist thought, as neatly delineated by Braidotti (2013). To Braidotti (2016, 4), the posthuman expresses a critical consensus akin to much feminist theorizing that there is no "originary humanicity" (Kirby 2011) to begin from, only cyborgian ontologies of co-constitutive relations, or, "originary technicity" (MacKenzie 2002). In the following introduction, we continue now to trace a partial picture of the relationships between feminist theory and the posthuman, as it often have moved by way of science and technology studies (see, respectively, the chapters of Stacy Alaimo, Myra Hird, Tania Pérz-Bustos, Ericka Johnson, Celia Roberts, Lynda Birke and Tora Holmberg in this volume), cultural studies, and post-continental philosophy. These are of course also veneered traditions of theory and practice, and feminist theory-practice, in their own right, opening up for a variety of postdisciplinarities beyond the scope and capacity of this introductory volume.

Introducing the Posthuman, and Its Cyborgian Roots in Feminist Science Studies

Decades ago, Donna J. Haraway pointed out how necessary it is to pay attention to the way in which humans are entangled in intricate relationships with technology and science, and with other nonhuman animals and the environment. Feminists responded further by producing the first explicitly posthuman texts in the late 1990s, stressing the cultural politics of posthuman bodies (Braidotti 1994; Halberstam and Livingston 1995; Balsamo 1996; Hayles 1997) and the impact of technoembodiment and digital mediation. From early works on the cyborg (Haraway 1991) to more recent work on agential realism (Barad 2003, 2007), the posthuman has proven to be productive for an ontological politics of feminist and critical theory, as prominently exhibited by Braidotti (2013).

As been pointed out, the term "posthuman" itself has come to designate a very loosely related set of attempts to reconceptualise the relationship between technology and human embodiment (Hayles 1997). However, popular and scholarly notions of the "posthuman" often signify vastly different and sometimes incompatible things. Troublesome posthumanisms in popular circulation often share a belief in modern progress or technology as salvation from bodily vulnerabilities, even from death. Uncritically celebrating Enlightenment ideals of anthropocentric humanism and progress, such posthumanism can even manifest as a form of super-humanism, or "transhumanism." Such transhumanism works to transcend or *overcome the body* through mind – or belief in science – and, thus, to complete the imagined mind-body split as well as to confirm the eerily religious authority of science. Transhumanist fantasies gets imagined in science fiction stories of digitally downloading minds or cryo-preserving bodies for posterity. However, such posthuman fantasies fail to consider the recalcitrant and connected nature of nature, of bodies and of embodied selfhoods as more than a bounded, cerebral affair of

willpower and intention. It seems to celebrate mind over matter, as if mind is not of biomatter (brain substance) or mattering itself (the embodied brain, think of mirror-neurons and neural up-takes beyond the surface of the skin). Transhumanisms are therefore somewhat incompatible with "doing" feminist posthumanities and the material-semiotics that support it. Transhumanisms stands as a different species of posthumanism, hinged on human mastery and a thrust away from bodily ecologies and their vulnerability. Attention to human and nonhuman vulnerability and bodily agency is however what has propelled corporeal feminist thought within for instance feminist science studies (cf. Treusch 2015; Górska 2016).

Science and technology studies at large have had very little to say on subjectivity in the poststructuralist registers of cultural research. In contrast, the widely popularized life sciences themselves have made us reimagine ourselves in genetic, molecular, bacterial, or neuronal terms. With riffs of anti-humanist theory, the laboratory life sciences and their popularized versions in wider cultural settings tell us much – often in estranging terms – about our multiple, split, and contradictory posthuman selves. In fact, contemporary bioscience seems indeed to substantiate anti-foundationalist, non-teleological poststructuralist and antihumanist theories of the embodied self. As mentioned above, newly mapped microbiomes call into question humanist assumptions of self-contained individuality: the sheer number of microbes that inhabit our bodies, including bacteria, viruses, protists or parasites, exceeds the number of our bodily cells by up to a hundredfold (Lingis 1993; Haraway 2008). We are clearly "companion species", engaged in lethal as much as enlivening games of *becoming with* one another (Haraway 2003, 2008).

It is in the feminist registers of science studies – especially after the feminist conception of the cyborg and in the postdisciplinary efforts of Donna J. Haraway to bring science and cultural studies together – we find especially fruitful starting points. Karen Barad's foundational work on the agency of matter and on posthumanist performativity (abridged and included in this volume) point to the generative and collusive nature of the long feminist science studies tradition of reviewing and working alongside the natural sciences and to the generative nature of feminist encounters with the natural sciences. In similar veins, feminist science studies scholars like Myra Hird and Celia Roberts, Sarah Franklin, Gillian Einstein, Ruth Hubbard, Lynda Birke and many others, are committed to the transformative feminist potentials inherent in the practice of science and medicine. These are domains of great agenda-setting social powers compared to social science and humanities research areas. The work of feminist technoscience studies has generated many of the contemporary theoretical innovations in sociocultural research that draw attention to various forms of posthumanist performativity (Barad 2003), ecological distribution of agency or multispecies relationality.

In empirically robust science conversations that meet up with feminist theorizing, Myra Hird (2009) has for instance provided an unusual example of posthumanist social science that boldly indexes the biotic world and bacteria as the origins of sociable life. With this microbial view of ourselves, we realize that identity is not the solid, solipsistic or bounded affair it has been made up to be: at the very least it is a hybrid geography, an ecology and a more-than-human affair (Whatmore 2002; Kirby 2011). As Hird argues, this fact also makes sociality not a

property of human societies but something as old as life itself. Haraway's notion of "companion species" (2003) is of particular relevance here too: as the biologically situated alternative to abstract conceptions of posthuman subjectivity, her feminist notion of all earthlings as "companions" who "become with" one another in mutual reciprocity offers respect for diversity and speciation processes without romanticizing hybridity. It points to the necessity not only of bringing onboard the feminist skills regarding *biologies at work* (as livingness and as science disciplines), but it also indexes the sources available to posthuman analysis within the fields of feminist ethics. The rich and various oeuvre of Haraway weaves together biological practices and epistemological politics with cultural studies insights on situated forms of subjectivity, thus paving the way for feminist posthumanities as something already both long-lived and as research still to come. Her postdisciplinary practices of doing the humanities signal the much needed shift from the nationalism and homogenizing humanisms otherwise describing much humanities research.

The humanities can no longer be regarded or practiced in the universalist mode of the 'best that has been throught or written', reflecting and reifying stereotypes of the human, humane and humanistic while *de facto* being tied to ethnonational expressions of European culture, racial, and gendered definitions of the fully human (Davidson & Goldberg 2004, 46). In a classical anti-humanist argument, Foucault once claims that we need to dethrone the concept of Man because it gets in the way of thinking with the high degree of accuracy and complexity required by our historical context (Foucault 1970, 343). Philosophers like Genevieve Lloyd, Elisabeth Grosz, Rosi Braidotti, Judith Butler, Cate Mortimer-Sandilands, and more recently Mel Y Chen and Christine Daigle, have since substantiated and amplified this claim for feminist theory, and posthuman or nonhuman feminist theorizing has since thrived in these veins. Put somewhat simplistic, it has paved the way for feminist theorizing without gender, and humanities work without the human (as its centrepieces).

Following from, and responsive to, the corporeal and materialist feminist philosophizing of diverse and wide-ranging scholars such as Braidotti (1994), Grosz (1994), Hayles (1999), Tuana (1989), Haraway, and many others, the time is ripe for gathering such efforts under different terms, set up strategically at a variety of universities, as suggested by Środa, Rogowska-Stangret and Cielemęcka (2014). Feminist posthumanities, we suggest, might do that work for us in its immersive and tentacular style of transversality. As the editors of this volume, we introduce here entry points to a multivalent form of feminist posthumanities as that strategic portmanteau or platform for changing the world and worlding the change. The stakes are high, the risks too. It will however provide seedlings for a new type of "humanities, worthy of our times" (Braidotti 2013).

Posthuman Humanities

It has in many ways become increasingly clear that nothing remains evident or given about the "human" of the humanities (Braidotti 2013). Stepping things up, Braidotti suggests posthuman humanities and critical forms of posthumanism

by way of continental thought (Braidotti 2013, 2016). The human, as a placeholder, stands for something deeply entwined with complicated wording practices also in more empirically associated research (Haraway 2008; Tsing 2012). If humans, as pointed out by posthumanities pioneer Cary Wolfe (2003), nowadays are more obviously that ever entangled in co-constitutive relationships with nature and the environment, with science and technology, with vulnerable embodiments of both human and nonhuman kinds, we have for sure also in the last decade witnessed the emergence of more-than-human humanities as a response (Wolfe 2003; cf Whatmore 2002). As Braidotti argues, all these entanglements have serious implications for the institutional practices of the humanities.

The posthuman turn occurred, we might say, at the convergence of different strands of scholarship and activism, broadly defined. If the humanities at large have proven at their most effective when, to use the Homi Bhaba's phrase, "the unhomely" stirs (1997, 445) – as in the cases of when cultural studies, feminist theory, indigenous studies, technoscience studies, human-animal studies, or ecocritique emerged decades ago – it is time we now acknowledge the always-already existence of many forms of posthumanities (Wolfe 2003).

Like how all posthumanisms are not painted with the same brush (Badmington 2000; Wolfe 2010), the urgency of actually dealing with the key issue in various branches of the posthumanities – namely, how to re-calibrate the humanities so as to attend to specific human and more than human interests while accounting for power differentials – is becoming an increasingly important task for all critical communities. Including those of the social science that no longer can claim relevance only by merit of studying society. Indeed, Cary Wolfe in founding his famous book series on posthumanities purposefully intended human-animal studies as a key area of concern for sociocultural commitment. At the same time, new areas of ecocritical and eco-philosophical posthuman feminist scholarship took centre stage (following on eco-feminisms) in the wake of human-animal studies and environmental humanities: for example, scholars addressed how supremacist theories of the human, based on various brands of humanism and anthropocentrism, have actively prevented research on the multiple "Others" of the Western humanities. The animal question in the humanities, including Wolfe's works, has since emerged as a field of its own (Weil 2010; Bull, Holmberg & Åsberg 2018). Here, too, eco-feminists have been paving the way for decades, with research on nature (Merchant 1980; Plumwood 1993), animals and speciesism (Adams 1990; Gaard 1993), capitalism (Gibson-Graham 1996), and the political ambiguity of well-meaning Western environmentalism (Shiva 1997).

Altering views to reality (ontology) and attending to the relational politics of ontology, posthuman humanities or posthumanities research underscore new materialist approaches in feminist epistemology. Obviously feminist posthumanities provides several entries as it originates *in medias res*. In the words of ground-breaking feminist new materialist scholar Iris van der Tuin, feminist posthumanities offer "a different starting point, a different metaphysics" (2010). Following the insights that the feminist posthumanities raise onto-epistemologically important questions, we might start then by asking with N. Kathryn Hayles: "What happens if we begin

from the premise not that we know reality because we are separate from it (traditional objectivity), but that we can know the world because we are connected with it?" (Hayles 1995, 48). In other words, feminist posthumanities insists on the practices of situated knowledges (Haraway 1991). Epistemologically, it also tries to overcome Eurocentric "epistemologies of ignorance" (Tuana 2008), that remain deeply embedded in Western practices of arts and sciences. It affiliates with decolonial options (Tlostanova 2017). Feminist posthuman thought propels itself forward also by its stubborn refusal to forget or "forgetting to forget," for instance, the time-honoured or buried thoughts of women philosopher physicists (van der Tuin 2011, 2015), the theory in the flesh (Moraga and Anzaldua 1981), or the feminist uses of Spinoza, Freud or Deleuze, Silvia Wynter and Douglas Adams, or other "alter-worlding" posthumanist imaginers *avant la lettre*. Re-purposing is key to such feminist posthumanities, regardless if it is previous philosophy, science or other social practices.

This historiographical method of rediscovery can perhaps be described as a "game of cat's cradle" (Haraway 1994), or as a postdisciplinary modus of "diffraction" (Barad) as it pushes the envelope, or "unruly edges" (Tsing 2012), of what we might here call feminist posthumanities as it is brought in conversations with voices seldom heard. Such posthuman historiographies aim also, if the analogy is suitable, to create a "calado" – a patch- and meshwork based on anything but poor forms of making-do, as Tania Péres-Bustos explores in this volume. This method emphasize connectedness and limits to knowledge, it highlights where differences matter and matter makes a difference. And most importantly it refuses progress narratives, teleology and scholarly hunts for the next new thing, while it acknowledges relevant pasts for the present.

"Posthumanities," the postdisciplinary modus operandi of related studies of the "posthuman," stands in such a view as more than the operationalisation of more-than-human scholarship (Whatmore; Wolfe). As intended with the prefix *post-*, it indexes, re-purposes and builds on that which came before. Importantly, posthumanities work recognizes the role of the nonhuman for the human of the humanities. It also ties together such political ontologies with more ethically sustainable epistemologies and postdisciplinary practices. For example, Wolfe defines his book series Posthumanities, mentioned above, as situated at a crossroads: instead of "reproducing established forms and methods of disciplinary knowledge, posthumanists confront how changes in society and culture require that scholars rethink what they do – theoretically, methodologically, and ethically" (Minnesota University Press, online). Similarly, Haraway (2008) – who has no patience with the over-determined notion of "the posthuman" – nevertheless finds the term "posthumanities" useful for "tracking scholarly conversations" on the changing relationships between the human and nonhuman, culture and nature, technology and the body, and Other and Self.

The prefix "post-" here does thus not signal any kind of end, but rather the inclusion or enrichment of the humanities in a perhaps counter-intuitive movement away from the conventional comfort zones of cultural critique and human-centred research at large. It questions and troubles human exceptionalism (Tsing 2012) and other normative forms of andro- or anthropo- or Eurocentric chauvinisms. As such, posthumanities, like the nomadic transversality of feminist analyses, may

well translate and mutate into several bodies of thought across disciplines, while benefiting from, and contributing to, the analytical approaches developed within the humanities. From situated knowledge (Haraway 1991) and embodied and embedded starting points, to the important *transcorporeality,* that is, ecological flows between porous and susceptible bodies, (Alaimo 2008, 2010) that make or break the living, these approaches make for rich analyses.

In short, as the "human" of the humanities is entangled in intricate and asymmetrical relations of reciprocity with animals, microbiota, and our environments, exceptionalist and supremacist assumptions of human nature seem increasingly difficult to sustain (Wolfe 2003). There is no self-contained individual human being to be held in position of mastery, no divide between nature and culture, no "advanced" civilization that masters the wild Others, and no universal humanism practiced across the diversity of our species: there are only sociable natures and relations that matter.

For better or for worse, we all now inhabit the posthuman condition, a situation that complicates scholarship in the critical humanities (Braidotti 2013; Braidotti and Gilroy 2016). We therefor need to recalibrate the humanities' highly specialized analytical tools for a wider set of phenomena. Feminist expertise on asymmetrical relations and their co-constitutive powers are particularly helpful here: care and curiosity, creativity and critique, imagination and concern, are what we now have to unlearn and learn anew as we transform the humanities habits from within..

Presented as such a learning-to-become-with practice, feminist posthumanities stand always as *more than one* possible response to the posthuman challenges to the humanities today (cf Lenz Taguchi, this volume; Braidotti 2013; Sjögren 2016). We may obviously draw on a rich set of meandering feminist alter-genealogies or anti-colonial critique and cyborg studies (Haraway 1991), science and literature studies, queer theory, cultural studies (Franklin et al. 2000), situated knowledge practices (Haraway 1991), advanced sex-gender theorising, power-knowledge praxis, feminist pedagogies, and sexual difference theory. Some of these are, under different headings, quite long-standing scholarly conversations; some are more recent. Some are yet to come or under rapid development, as seen in Matthew Fuller's special issue of *Theory, Culture & Society* on 'Posthumanities' where feminist and media ecological approaches meet to map the infrastructures of posthumanities.. However, for the purpose of this volume and its implied communities we draw on feminist or pro-feminist lineages of all kinds. For instance, some of the long-standing theorizations of *sex and gender* (the nature-culture conundrum of feminist theory) trace gestures of *denaturalisation*, such as Donna Haraway's cyborg ontology, Judith Butler's dispelling of any heteronormative foundation of biological sex, Stacy Alaimo's influential postnatural form of eco-feminist studies, or Myra Hird's insistence on all organisms' inherent, cellular transsexuality. However, such feminist theorising also simultaneously traces the parallel ontological, bio-affirmative, or perhaps renaturalising, turn of feminist theory-practices exemplified by authors such as Elisabeth Grosz, Lynda Birke, Elisabeth Wilson, Vicki Kirby, and Karen Barad, to name a few. In any case, feminist posthumanities are *not post-biological* (but insist on corporealities), yet firmly *postnatural* (Åsberg 2018).

Postnatural Feminisms

The postnatural feminist lineages suggest that nature itself (as an unrecognizable category to which we ourselves belong) is articulate, literate and proliferate, which puts a completely new demand on feminist postdisciplinarity and skill sets. If posthumanities is about recognizing and acknowledging the company of predecessor thinkers or postnatural natures' own literacies, its practitioners may not always be found in the academic world. This may demand of us some strange conversations with other community-builders and knowledge practitioner who were there all along, but often stay unacknowledged (Åsberg et al. 2015). Feminist theory defends a partial vision that tries to stay clear of the Scylla of bulldozing universalism and the Charybdis of disempowering relativism in its inconsequential particularity. Instead, *consequential matters*, stories that matter, and matters that matter in different ways, are the political objects of feminist posthumanities analyses, and co-constitutive relations are the smallest common denominator of study (cf. Barad 2003; Haraway 2008).

We have seen feminists develop different forms of analytical accountability to a more-than-human humanities, the inhuman humanities (Grosz 2011), the posthuman humanities (Braidotti 2013), or feminist posthumanities (Åsberg 2008). They do so under various headings, including material feminisms (Alaimo and Hekman 2008), neomaterialism (Braidotti 2002), zoontology (Wolfe 2003), the affective turn (Ahmed 2004; Koivunen 2010), new materialism (Coole and Frost 2010; Dolphijn and van der Tuin 2012), postconstructionism (Lykke 2010) material ecocriticism (Iovino and Oppermann 2014), ahuman ethics (MacCormack 2012), inhuman theory or feminist theorisings of the nonhuman (Hird and Roberts 2011), eco-feminism (Plumwood 1993), interactionism (Tuana 2008), queer ecologies (Mortimer-Sandilands and Erickson 2010), posthumanist phenomenology (see Neimanis this volume), vitalism and vibrant matter (Braidotti 2006; Bennet 2010), queer death studies (Lykke 2015; Mehrabi 2016), critical disability studies, and monster theory (see, for example, MacCormack and Shildrick in this volume). Other frames include Irigarayian sexual difference, postnatural ecofeminisms, material-semiotics after Michel Serres, reproductive story-telling after Marilyn Strathern, cyborg studies after Haraway, or the ontological turn in science and technology studies in the wake of feminist science studies scholars such as Maureen McNeil and Lucy Suchman.

As all kinds of post-disciplinary responses to the unruly worldliness that contradicts human supremacy, feminist posthumanities aims to discover our rhizomatic and multi-directional (Braidotti 1994) entanglements with each other. It points to a multitude of people, technoscience, global media, biotics, ecologies, animals, finance, land, and other lively matters for consequential but nonteleological purposes of story-telling in feminist scholarship. The purpose of such feminist scholarship is by no means to assert the capacities of nonhumans at the expense of the differently situated humans, but to "stay with the trouble" and inquire how we might, with some grace, be able to live together in more-than-human worlds (Haraway 2008).

As here indicated, the situation for feminist posthumanities today remains especially coloured by its legacy of feminist science studies and its insistence on the bio-curious creativity of feminist theory, as is evidenced in the works of feminist environmental humanities pioneer Stacy Alaimo, or in the transformative and alter-worlding works of Eva Hayward and her collaborations with feminist biologist Malin Ah-King. Gender, like "genus" and "generation" (Hemmings 2011, van der Tuin 2015), may well in this setting be remembered for how it has functioned in academic institutions: as an engine of discovery as much as a category of critique. Haraway's work, especially her figuration of the cyborg, with its insistence on a material-semiotic relationality that indexes our sense of belonging, stand in any case out as particularly fertile starting point for feminist posthumanities.

Yet even in the "always-already naturecultures" modus operandi that we highlight here, feminist posthumanities remains (after a long decade of fervid activity) a multi-headed response defined by its open-endedness, transversality, and its inter-, trans-, or post-disciplinarity. In fact, we insist that feminist posthumanities today is just one term for a response among many others. But it is one particularly suited to the age-old feminist question, within the authoritative annals of the humanities and sciences, of "who gets to count as human, and at the expense of whom?" Our feminist thinking matters; it is a transformative device we may use to think other stories or matters with, as pointed out by Strathern (1992) and paraphrased by Haraway.

Storying Matters Between the Postnatural and the Posthuman

We have been arguing that nature is no longer separable from culture, and we simply cannot afford the luxury of thinking them apart (Alaimo 2010, 15). Instead, we must grapple with the larger question of how to deal with the implications of this complex entanglement: what kinds of ethics and critiques, arts and sciences, politics and methods, can account for the changes on spatial and temporal scales introduced by climate change or the emergence of the "politics of Life itself" (Franklin, Stacey and Lury 2000; Rose 2001). And how can we produce valuable worldly accounts and still stay truthful to the specificity of each particular case and location? How can we deal with human accountability in an age of anthropogenic environmental transformations that some call the Anthropocene (or worse, the age of Man)? Can cultural critique rise to the challenge of these complexities and to the radical immanence of events unfolding, both in the world, in the discourse of the sciences, the arts, and in theoretical practices? This everyday "mangling" of science, technology, health, and environmental concerns with popular culture, embodiment, policy-making, and feminist critique demands not just new but generative approaches to both human and nonhuman subjectivity.

More specifically, the project of redefining the embodied posthuman or more-than-human subject enlists not only cognitive practice but also the resources of the imagination, affects, and ethics. It also demands a renewed commitment to the political (Radomska 2016) and, "reworlds" ethics at large with its insistence on

nonhuman facticity. Most importantly for our argument here, such a large theoretical and political shift of perspective could not fail to affect the institutional practices of the humanities. If the humanities today are to honour their location in the midst of this new and complex naturecultural continuum, they need to review what remains of their former attachment to "Man" as the emblem of the vision of the human they intrinsically upheld and explicitly empowered (Braidotti 2013).

This book starts from the assumption that critical and creative feminist thought and practices of living with "unsettled relations" (Thornham 2001) have a unique contribution to make to the repositioning of the human and the humanities in relation to the posthuman condition (Braidotti 2002; Åsberg, Kobak & Johnson 2011).

Taken together, this volume's essays pursue a two-fold goal: first, to present an overview of a vast and diverse scene of ongoing conversations through examples, cases, and essayistic deliberation; second, to outline and assess what feminist posthumanities might entail, both in theory and in practice, for ethics, politics, subjectivity, imagination, story-telling, and institutional and knowledge practices that reach beyond the humanist anthropocentric frameworks. This volume brings together the various feminist communities in, or parallel to, science studies, cultural studies, and philosophy to theorize contemporary human subjectivity and remake the worlding practices and material imaginaries of the humanities. Attention to embodied subjectivities and the material structures of the imagination within feminist posthumanities therefore also entails a lively and re-enlivened attention the conflicts and contradictions of planetary politics. Such an approach is necessary to our continued survival, as most feminist scholars understand. As Val Plumwood famously remind us, "We will go onwards in a different mode of humanity, or not at all" (2007, 1).

Finally, Feminist Posthumanities

If the posthuman (Braidotti 2013) and various posthumanisms stand as terms and philosophical challenges that aim to redefine the human in the light of deep-working social, environmental, medical, and technoscientific transformations of the 20th and 21st centuries, the feminist posthumanities is the imperfect praxis thereof. Imperfect since there are no maps for these postdisciplinary territories. It stands also for an attempt at a different mode of humanity, as much as a different modus operandi of the humanities. In experimental ways, feminist posthumanities works to make the contemporary humanities integrative, transformative and relevant. It works through various subsets of material-semiotics and decolonizing moves – such as new materialisms, feminist science studies, and various ontological turns to ethics – and, like a rickety bio-machine oiled by collective feminist creativity, it works by acknowledgment of limitations, and of course some sly academic subterfuge, for its survival.

As an academic trickster figure of postdisciplinarity, feminist posthumanities can encompass human-animal studies, plant theory, corporealities, cultural studies, science and technology studies, medical humanities, media studies and digital

humanities, educational sciences, child studies, post-Derridean or post-Foucauldian studies, art and crafts, gender studies, cultural geography, vegan philosophy, queer theory and unnatural sexuality studies, environmental humanities, heritage studies, and much more, as indicated by the chapters of this volume.

We contend as editors that feminist posthumanities (Åsberg 2008; Braidotti 2017) is but one strategic intellectual platform for these theory-practices. Now, this volume offers an introduction to its lively and thriving endeavours within already existing, waning, re-emerging, or more novel areas of research. In the essays that follow, we find areas, interdisciplines, and feminist materialisms practiced, such as human-animal studies (Birke and Holmberg), cultural studies (Fuller), environmental humanities (Alaimo and Neimanis), digital humanities (Holloway-Attaway), medical humanities (Shildrick and McCormack), archaeology (Fredengren), musicology and art research (Tianen and Bolt); science and technology studies (Hird, Pérez-Bustos, Johnson, Roberts); posthuman studies (Lykke, Braidotti and MacCormack); educational sciences and feminist materialisms of various kinds (Lenz Taguchi and Barad). These essays testify to a thriving community of supra-disciplinary research of great societal relevance from within, or around, the humanities.

Cognisant of shifting terrains in (and under) the contemporary humanities, feminist posthumanities works transversally so to also withstand the tectonic shifts of neo-liberal academia and cognitive capitalism, a third phase of capitalism, where accumulation focuses on immaterial assets and the virtualization of economy, networked brains, property rights, and science as determiner of possibilities for innovation and collaboration while at the same time altering everything living at an unprecedented scale (Braidotti 2017). Put simply, it engages with critical and creative pursuits that address our changing relationships between political animals of both human and more-than-human kinds, and among bodies, technologies, and environments. Feminist posthumanities generally employs interdisciplinary or postconventional perspectives (Åsberg 2008; Braidotti 2017) oftentimes this is research that already thrives on the margins or outside of scholarly comfort zones.

In an academic world of cognitive capitalism, feminist posthumanities create choreographies that insist on the creativity of indigenous, local but also planetary and feminist ways of knowing. Whatever it touches, it transforms, re-purposes, and alters, borrowing like a magpie to build nests in high places. It brings the material consequences back with a vengeance, and it insists on the worldliness of thinking at large. Philosophy, art, and science stand here as corresponding concepts for the ability to enter into modes of relation (Braidotti 2017), to affect and be affected, sustaining qualitative shifts and creative tensions accordingly. Thinking is worldly practice, as pointed out by Stacey Alaimo. Thinking within the veins of feminist posthumanities also centers on a feminist ethic of relationality, care (Puig de la Bellacasa 2017), and difference (Braidotti 2006). Feminist posthumanities functions thus by what Braidotti has identified as a shrewd resistance to the gravitational pull of logocentric thought systems in academia and society at large, and by the vivid actualization of transversal relations, nomadic subjectivities, and multi-directional transpositions (Braidotti 1994, 2002, 2006, 2013). Thinking is indeed the stuff of the world (Alaimo 2014).

So is creativity, and the limitations that generate it. In the words of Anna Tsing, posthumanities is perhaps most clearly methodological in its insistence on daring "to tell the history of the world in a single sentence, or certainly a short essay" (2012, 141). Like Haraway, when she suggests we "read[ ] the organism like a poem," it is about an immanent form of creativity in which we can take part. It is about materially embedded story-telling practices, about daring to acknowledge being, not in the centre, but in the midst of the world, while at the same time abhorring narcissism and self-absorption. The posthumanities as scholarly and more-than-scholarly practice is then about meeting and gracefully existing in the company of other *sociable natures* – human and non-human, feminist or not. Feminist posthumanities signals the go-ahead for cultural and science scholars to reject not only the nature-culture divide in theory, but also the division of scholarly labour it upholds and to practice research differently. As the feminist science studies tradition recommends, we cannot leave science to the scientists but must engage with it passionately and work to appreciate its changing nature from within. In addition, it invites scientists to explore further their story-telling practices and creative impetuses. In the interstices of science and art(s), posthumanities find wonder.

Feminist posthumanities, with its internal diversity, patchworked and mixed genealogies, is a field both mature and in its infancy at the same time. From the vantage point of minoritarian desires, where unmarked posthumanities as such already has succeeded in major ways, it aims to territorialize minor subjects at a greater scale and speed. In that sense, feminist posthumanities need now make clear its affinities to the decolonial option, to other queer, crip or decolonial humanities opportunities. While ongoing as a core activity, this work is nevertheless still largely ahead of us.

Feminist posthumanities signals most importantly that we need a qualitative shift of attention. In the these days of populism, Trumpism, nationalism and new right-wing movements that directly target feminist research, gender studies, the humanities and even whole universities [#westandwith CEU], it has become increasingly clear that the humanities need to go onward in a feminist mode of relational affinity and integration, or not at all. As a hybrid spawn of mixed conditionings, feminist posthumanities embraces the unknown: it thrives on *xenophilia*, as all academic research should.

Strange encounters are of course key to this endeavour, a willingness to expose oneself to the unknown, to alienation. Nothing remains natural or given, yet all is worldly and processual. Feminist posthumanities can contribute to what Gloria Anzaldua termed an *oppositional consciousness* – a double vision of renaturalization and denaturalization – as well as postconventional community-building with scientists, environmentalists, and animal and body activists. It provides critical and creative re-toolings of the human sciences from their starting points in the embodied and embedded worldliness of knowledge. But it does certainly not stop at the borders of the so-called human sciences. Respectful conversations across disciplinary borders, processes of "rooting and shifting" (Yuval-Davis 2017), might ensue at such crossroads. Feminist posthumanities is but one possible name for such encounters, as it rejects both extreme culturalism and naturalism, living instead in the transdisciplinary borderlands of the arts and sciences today.

Not Over, but Otherwise

Crucially, the prefix "post" of posthumanities does not, as mentioned, signal a terminal crisis or ending, but a generative shift of humanities research beyond its classical anthropocentrism: a reinvigoration of the field geared to the social, environmental, and scientific challenges of the third millennium (Braidotti and Gilroy 2016). The "post" does certainly here not imply a postfeminist nor a postbiological stance (Åsberg 2009), but on the contrary, it signals both critical and creative framework for performative and generative accounts of technoscientific or other naturecultural practices across disciplines and categories.

As the diverse contributions in this volume show, feminist posthumanities may unfold into a series of sub-sets or rhizomic folds that both encompass and by-pass each other. For example, human-animal studies, medical humanities, and environmental or ecological humanities (Squier 2004; Alaimo 2011; Rose et al. 2012; Rose 2015), as well as new media and digital humanities (as presented by Holloway-Attaway in this volume), have all generated new forms of posthumanities. They may thus engender feminist cultural studies with a transbiological twist or ecologically embedded ethics (Alaimo 2008). They may encompass human-animal perspectives in technoscience, marine life in musicology, or the ethnography of southern women's stitching technologies. In all cases feminist posthumanities means reaching out, becoming *(k)nomadic* (Cielemęcka 2015), and composing with others a missing population, standing like modest witnesses on the shoulders of giants, aiming to become accountable companions to troubled and rich intellectual heritages.

It also involves critical conversations between scholars differently invested with feminist knowledge practices and with different emphases. It thus entails also tensions and, we hope, attempts at inhabiting those tensions gracefully. Clearly, the "feminist" of feminist posthumanities circumscribes not one feminist position or standpoint (Franklin et al. 2000) but a multitude of situated perspectives on the posthuman condition. It is our hope that they will be conducive to transversal alliances and continued conversations. In all its variety, feminist posthumanities, as we showcase in this volume, encircles a premise in which to re-think human nature, and consequently practice the humanities, *otherwise*.

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Chapter 2
Passionately Posthuman: From Feminist Disidentifications to Postdisciplinary Posthumanities

Nina Lykke

I hold a doctoral degree from a faculty of the humanities and was educated as a literary scholar, but my relationship to the humanities has for years been ambivalent and troubled. I do not easily identify as a humanities scholar. Instead, I have come to position myself as a posthumanist and postconstructionist feminist scholar who belong to an international, trans- and postdisciplinary scholarly community of critical intellectuals with various kinds of affiliations to political movements which struggle for social and environmental justice – feminist, queer, transgender, anti-racist, anti-colonial, anti-ableist, environmental etc. movements. In academic terms, I am professor of Interdisciplinary Gender Studies, which I define as a postdisciplinary discipline as elaborately reflected in earlier work (Lykke 2010, 2011). In this chapter, I will make myself accountable for my troubled relationship to the humanities and elaborate on the ways in which I position myself in a feminist version of postdisciplinary *post*humanities.

I will first present my ambivalent position of belonging as well as not belonging to the humanities. Alongside of my argument, I shall also suggest that the humanities can be considered as an imagined community that makes certain identity political claims and discuss my position as one of disidentification. Secondly, I shall discuss the humanities' iconographic centrepiece, the Universal (Hu)man, and how my feminist disidentification with this icon prompts me to take other directions towards the investigation of posthuman subjectivities. Thirdly, I will discuss current transformations of the humanities. These transformations are, on the one hand, obviously prompted by neoliberalist quests for commodification and demands that humanist research show utilitarist use value. On the other hand, they are also generated by waves of questions raised by critically disidentifying intellectuals like me, who speak from positions made possible by social movements such as feminist,

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_2

queer, anti-racist etc. movements. In the third section, I shall try to briefly outline some modest guidelines, which I myself find helpful as approaches to doing posthumanist research, prompted by these waves of critical questions. Fourthly, I shall illustrate the analytical use of the guidelines through an example from my own research on cancer cultures, mourning, death and dying. In conclusion, I shall wrap up my reflections on the reconfiguration of humanities as posthumanities.

Disidentifying with the Classic Humanities

Following earlier reflections on queerfeminist Judith Butler's as well as queer of colour scholar José Esteban Muñoz' work on the concept of disidentification (Butler 1993; Muñoz 1999; Lykke 2014), I define my relationship to the humanities as one of disidentification. According to the definitions of Butler and Muñoz, disidentification refers to an act of positioning oneself in-between belonging and not-belonging. Butler explains the position of disidentification from the point of view of social movements and other imagined political communities standing under the banner of an identity political unifying signifier as for example "women" or "queer". According to Butler's analysis, the act of disidentification is prompted by the unease produced by intersecting sets of power differentials which the unifying signifier glosses over. The clash between the unifying signifier and the intersecting power differentials in which each individual participant in the imagined community is embedded, calls forward an "uneasy sense of standing under a sign to which one does and does not belong" (Butler 1993, 219). Even though the notion of disidentification primarily has been used as a tool to understand social movements with identity political agendas, I suggest that there are parallels to what happens to academic communities and identities. Besides the more scholarly defined delimitations of disciplines and faculties, these different compartments of scholarly knowledge production are also delimited vis-à-vis each other by their way of performing as imagined communities with specific identity political agendas and power claims. Reflecting along these lines, I think that "disidentification" is an apt characterization of my relationship to the humanities.

On the one hand, I "belong" to the humanities according to scholarly definitions of this kind of belonging. My master and doctoral degree certificates bear the stamp of faculties of humanities. The academic tools and outlooks which I have brought into the trans- and postdisciplinary field of intersectional feminist studies which I inhabit now are definitely emerging out of my background in the humanities. I master the tools of a literary scholar, and I strongly identify with all the sophisticated ways of doing analyses of narrativity, tropes, positions of enunciation, genres etc., which characterize the tool box of a literary scholar. I love to explore where these analytical tools bring me in traditional contexts of a literary scholar, but in particular, in new and unexpected trans- and postdisciplinary domains.

On the other hand, I do not "belong" to the humanities. I observe the current struggle for survival that is happening within the humanities from its margins.

I distanced myself from the humanities years ago, when I moved to the trans- and postdisciplinary field of intersectional feminist studies in terms of research and teaching, and, in particular, when, 15 years ago, I was appointed professor of Interdisciplinary Gender Studies in a department for interdisciplinary studies, the Department of Thematic Studies at Linköping University in Sweden. The department is located at a faculty for arts and sciences, but makes an explicit point out of crossing borders between all main fields of knowledge production. It is organized around thematic areas, "Themes" such as gender, childhood, technology, environment, and "theme" is in the department and overall at the university considered as an alternative to "discipline" in terms of the mode of organization as well as the knowledge produced. Transgressions not only of disciplinary borders *within* the humanities, social sciences, natural, medical and technical sciences are daily practice, but also transgressions of borders *between* these main areas of academic knowledge production are a hallmark of this department.

In addition to my literal academic belonging to this transdisciplinary environment, my disidentification with the humanities is also based on my critical feminist approach to the genealogies of the humanities in nationalistic, ethnocentric and colonialist projects, which classics such as among others Said (1978), Minh-Ha (1989) and Spivak (1999) spelled out so unmistakably clearly that only racist, sexist and colonialist epistemologies of privileged ignorance (Sedgwick 1998, 23–51) could gloss over it. I am also critical of the methodological nationalisms (i.e. the ways in which ones own nation or region of the world is taken as the horizon of research) (Braidotti 2011, 209–239), in which much humanities as well as social science research have been and still are embedded. As a feminist, I find the humanities disciplines' traditional cultivation of national canons of literature, arts and so on very problematic together with the ways in which European colonial legacies and Euro- or Westerncentric schemes of thought often are blindly reproduced. I know that I share this criticism with many feminist scholars who stayed within humanities disciplines, but – unlike these scholars – I do not spend my time criticizing the humanities from within. Academically, I inhabit other spaces and am embedded in other kinds of scholarly and political debates. What I discuss with my colleagues at the different theme-organizations at my department as well as in the world wide transdisciplinary feminist research community to which I belong, is not the question: how and on which conditions can and should the humanities survive? What I prefer to discuss instead is how can multi-, inter-, trans-, and postdisciplinary knowledge production thrive and prosper and push research on global problems beyond any kind of disciplinary myopia and tunnel vision including the tunnel visions developed by much faculty divided research, including that of the humanities.

This is the background against which I describe my relation to the humanities as troubled, and interpret it via Butler's concept of disidentification. I cannot deny that I stand under the banner "humanities" since I received my academic degrees and training in faculties of humanities. But to be true to feminist critiques of the humanities and its iconic centerpiece Universal (Hu)man, I cannot stand under this banner without experiencing a strong unease, feeling that I both belong and definitely do not belong.

From Human to Posthuman Subjectivities

As my feminist disidentification with the humanities revolves around their iconographic centerpiece, the Universal (Hu)man, I shall discuss a bit more elaborately how this banner make me feel unease and prompts me to take other directions.

I consider the "universal human subject", implied when the humanities are defined as scholarly domain for knowledge production about "the human", to be most often a Eurocentric construction, embedded in hegemonic and normative discourses celebrating the endeavours of class privileged, predominantly white, heterosexual, disembodied masculine subjects, and binary and hegemonic constructions of Man-Woman, White-Black, Mind-Body, Human-Animal, Culture-Nature, etc. Instead of subscribing to these discursive constructions which, seen from a feminist point of view, definitely do not represent viable and sustainable starting points for new and promising approaches to world making knowledge production, I prefer to commit myself to the processes of deconstruction of the humanities' disciplines notions of "the human subject" starting in its messy, bodily ruins.

I see these embodied ruins as productive sites for reflections on "posthuman subjectivities", understood as assemblages or entanglements of corpomaterialities, affectivity, transcorporeal relations and intersectional power differentials. The ruins work well as a starting point for a disruption and reworking of the human subject as posthuman subjectivity, i.e. as a more-than-human subjectivity that, contrary to the self-understanding of classic humanities, is firmly anchored in notions of human *un*exceptionalism. From this vantage point, it is, I think, important to explore strategies of posthuman resistance, in particular, the role of affects, bodies, sexualities, vulnerabilities, pleasure, pain, passions in processes of decolonization, democratization and building of sustainable transcorporeal relations.

This outline of a starting point for a disruption and reworking of the human subject is based on the assumption that intersecting processes of disidentification, resistance and disruption of hegemonic power relations cannot unfold without being nourished by strong bodily, transcorporeal and affective sources. Moreover, I take it as a point of departure that human and non-human bodies, entangled in transcorporeal relations (including so-called "environments"), are disciplined by capitalism, colonialism, racism, heteronormativity and other hegemonic power regimes to function in complicity and compliance with intersecting institutionalized norms (gender, race, ethnicity, class, sexuality, age, dis/ability, geopolitical position, regimes of health/illness, human/earth other (Plumwood 1993) etc.). But I also assume that norms and institutions do not only produce complicity and docility, but that they at the same time co-produce unease, pain, discomfort, vulnerability etc., which sometimes lead to political immobilization, but in other instances generate resistance, disidentification and disruptive movements of change.

So the "human" subject of the classic humanities is, as I see it, to be deconstructed and prompted to a new becoming as posthuman in the messiness of the world. Let me refer to Donna Haraway who talked about subjects as being in the "belly of the monster" (Haraway 1991, 188). And let me also interpellate a posthumanist scholar

before posthumanism, namely the Russian cultural and literary critic Bakhtin (1984) who wrote about the carnivalesque, laughter and the grotesque body as a contrast to the clean, classic well proportioned body of the Vitruvian Man – thus challenging one of the symbols par excellence of classic European humanism. The human subject becoming posthuman in the belly of the monster or as a grotesquely embodied subject, vulnerable, leaking, monstrous, laughing, shouting, crying, having orgasms, birthing, dying is to me a good starting place for a rethinking of "the human" of classic humanities.

Let me interpellate Vitruvian man as a skinny and hairless cancer patient who has come to live and die with the disease due to environmental pollution, or as an illegal migrant from an African country in a overcrowded boat on the brink of sinking while headed towards Lampedusa. There are lots of potential starting points for a reworking of the classic humanities as ethico-politically accountable posthumanist knowledge production, and for pushing the human subject in its process of becoming posthuman. These are just some examples. And speaking of the Vitruvian man, let me not forget to mention Donna Haraway once more who ironically puts a drawing by cartoonist Sidney Harris from 1996 on display, showing Vitruvian man as a dog emphasizing the porous borders between human and animal (Haraway 1997, 159), and reminding classic humanists that the process of becoming posthuman is definitely also involving a stepping down from the position of human exceptionalism, i.e. from the idea of the human as superior to animals.

Reconfiguring the Humanities as Postdisciplinary Posthumanities

I am, of course, not the only one to criticize the humanities along the above described lines. Waves of criticism, carried by feminist, queer, anti-racist, postcolonial thinkers, writers, and artists, have, indeed, emerged during the last decades. As noted by feminist scholars Åsberg, Koobak, and Johnson (2011), we may even claim that feminist research, in particular, has "always already" been post-human in the sense of deconstructing Universal Man as centerpiece of the humanities. Twisting Bruno Latour's title "We have never been modern" (1993), we may coin the phrase "We (all of us who could not represent Universal Man) have never been human".

Under the influence of these critiques, the humanities are, indeed, changing. The transformations currently happening at humanist faculties are, on the one hand, desperate attempts to align with neoliberalist demands for commodifiable products, employability and market value, but, on the other hand, I shall contend, the changes are also prompted by the critical work of disidentifying intellectuals who surfed the waves of feminist, queer, anti-racist and other critiques.

So if I, from my position of disidentification, shall describe these processes of transformation within the humanities, what do I see happening, and which are the emerging schemes of fresh thought? One of these schemes is definitely the feminist

posthumanist branch of academic knowledge production, discussed in this book, and its outlining of the figuration of the posthuman as a new horizon which replaces the Universal (Hu)man. I find the posthumanist endeavors to transform the humanities positive and promising. I agree with Rosi Braidotti, when she states that:

> I think the Humanities can and will survive and prosper to the extent that they will show the ability and willingness to undergo a major process of transformation in the direction of the posthuman. To be worthy of our times, we need to be pragmatic: we need schemes of thought and figurations that enable us to account in empowering terms for the changes and the transformations currently on the way (2013, 184).

To elaborate my stance on the changes which are needed for the humanities to "be worthy of our times", I shall underline that, for me, to take up the challenges, called forward by the figuration of the posthuman and a posthumanist stance, goes hand in hand with a carving out of postconstructionist and postdisciplinary positions. With the notion "postconstructionist" I define endeavors to take the achievements of feminist social constructionist critiques of biological determinism and cultural essentialism into account, but at the same time to transgress them in terms of carving out conceptualizations of the entanglements of bodies and subjectivities (Lykke 2010). With the term "postdisciplinary" I refer to modes of organizing academic knowledge production, which are not any longer based on a monodisciplinary foundation (Smith 1998; Case 2001; Lykke 2010, 2011).

To make myself more precisely accountable for my take on posthumanist, postconstructionist and postdisciplinary feminist research, I shall give a glimpse of the emerging schemes of thought, approaches, methodologies and ethical stances which to me appear as most promising in order to make a productive difference in the landscape of humanist knowledge production. This is in some way a hard job, because the fresh schemes of thought, approaches, methodologies and ethical stances which I find needed, exciting and promising, are diverse and heterogeneous and resist being summed up in a couple of bullet points. But for the sake of comparing notes within the framework of this volume, I shall make a try, and draw special attention to scholarly endeavors to invent new embodied, affective, ethically sustainable and spatiotemporally located entrance points to the analysis of the intra-activity of the semiotic, the material and the affective, discourse, matter and affectivity. Material-semiotic (Haraway 1991, 200) and material-discursive (Barad 2007, 152) approaches together with tools to understand matter in a neovitalist feminist and affirmative vein as affect-laden and dynamic (Braidotti 2011, 199f) or vibrant (Bennett 2010) can to some extent sum up the endeavors of the scholarly communities which I find most exciting and promising.

What in particular is needed, as I see it, is theories, approaches, methodologies and ethical stances which are posthumanist, postconstructionist, and postdisciplinary in terms of resonating with the following five guidelines calling for:

1. a transgressing of any kind of universal and hierarchizing cuts between subject and object, which also implies a postdisciplinary transgressing of any preset disciplinary and faculty borders allowing only well reflected provisional or "agential cuts" (Barad 2007, 175);

2. a taking seriously the insights of poststructuralist deconstruction and Foucauldian understandings of the productive power of knowledge production, including the construction of disciplines, acknowledging the many ways in which the agency of language and discourse frame our endeavors (including the academic ones) in manners we cannot control or make fully transparent to ourselves, but also in a postconstructionist vein to look for the entanglement of discourse and matter;
3. an addressing of the ways in which all so called human phenomena are in a posthuman manner co-constructed by human and non-human actors, and how bodies and technologies are constantly being entangled in each other;
4. a taking seriously into account the agency of bodily and transcorporeal (Alaimo 2008) materialities – which Donna Haraway poetically talked about as the "trickster" qualities and "witty" agency of matter (Haraway 1991, 199), and which Rosi Braidotti theorized as "life as zoe", as generative, dynamic, inhuman, affective energy (Braidotti 2006, 36f);
5. an embedding of all scholarly knowledge production in ethico-onto-epistemological considerations (Barad 2007, 185), i.e. reflecting the ways in which ethics, ontologies, and epistemologies are "always already" entangled.

To work on a semiotic-material and discursive-material basis, with only provisional cuts in knowledge production, and taking into account the above guidelines requires radically different ways of working and organizing in Academia than those currently in vogue. In particular, the division of labor between humanities, social sciences, medical, technical, and natural sciences needs to be transgressed in new postdisciplinary modes of organizing. The division of labor between faculties has separated and compartmentalized analyses of sociocultural, human issues, on the one hand, and issues related to nature, the biological body, matter, and the non-human, on the other. Alongside of this compartmentalization, disciplines and faculties have often performed as hegemonic structures that prevent the creation of open, transversal dialogues across disciplinary and faculty borders. The disciplines' and faculties' policing of their borders have created obstacles to the kind of free boundary crossing which is required for the emergence of unexpected synergies between the humanities, the social sciences, the medical, the technical, and the natural sciences. Therefore, it is important that the creation of the new posthuman humanities or posthumanities go hand in hand with a pushing for postdisciplinary modes of organizing academic knowledge production.

An Analytical Example: The Production of a Cancer Patient

Let me illustrate the above briefly outlined five guidelines, which to me seem useful to keep in mind when designing posthumanist, postconstructionist and postdisciplinary research. Let me, however, also underline that they should be considered not as a normative grid, but as open-ended guidelines, which may or may not appear relevant to interpellate vis-à-vis a specific research context.

The example is a glimpse from my current research on cancer cultures, mourning, death and dying. To analyze the ways in which a cancer diagnosis drastically changes the spatiotemporalities of the everyday life of the subject who is confronted with the diagnosis, I chose a *provisional cut*, or apparatus of analysis (cf. *guideline* 1 above): Donna Haraway's concept of the apparatus of bodily production (Haraway 1991). This concept, which understands bodies as culturalbiological, networks of discourse, technologically reconfigured matter and bodily materiality with trickster qualities is my chosen apparatus of analysis. Through this apparatus, I make a provisional cut and carve out the dimensions needed in my analysis. In line with Haraway's account of the concept, I need to take into account three entangled dimensions: *body as discourse*, *body as technologically reconfigured matter* and *body as trickster*, i.e. dimensions which resonate well with the *guidelines 2, 3 and 4*, mentioned above.

Let me go quickly through the three dimensions: In terms of the *agency of discourse*, I note that the cancer diagnosis pushes the patient to take into account that the visible bodily signs of the cancer (such as drastic weight loss and hair loss due to chemotherapy) links hir to the taboo which sticks to the C-word and the symbolic equation, "cancer = horrific-uncontrollable-disease-leading-directly-to-death" (Sontag 1978; Stacey 1997). This is a taboo which makes people shy away if the patient does not cover the signs of decay and smile bravely back to the world (Lorde 1997; Ehrenreich 2009). Seen from the perspective of the *agency of technologies mobilized to cure or alleviate the cancer*, the apparatus of bodily production of a cancer patient is characterized by the ways in which cancer treatment, among others systemic chemo- and radiation therapies, which figure as iconic, very literally reconfigure human bodies. Hair and weight loss are the most spectacular externally appearing effects, accompanied by a tsunami of inner reconfigurations from wished-for ones such as dying cancer cells to the ones one has to bear with, such as a strongly weakened immune system or a much too low blood percentage. Finally, seen from the perspective of the *body as trickster or witty agent*, the apparatus of bodily production of a cancer patient, indeed, involves bodily agency beyond human control. Cancer cells perform perfectly in the role of tricksters growing wildly without respect for the boundaries of organs. It is precisely this uncontrollable and excessively vital growth which makes cancer into such a scary disease, which prompts Rosi Braidotti to remind us that "Zoe can be cruel: cells split and multiply in cancer as in pregnancy" (2006, 259).

Finally, let me outline my *ethico-epistemo-ontological approach* to the cancer cultures project (cf. *guideline 5* above). The research is situated in the affective context of my mourning of my lifepartner's cancer death. Moreover, it is linked to a broader transdisciplinary project on communication and cancer counseling in the health care system. Epistemologically, it is anchored in feminist epistemologies of situated knowledges (Haraway 1991). It is based on a belief in research, which is carried by affectivity and commitment of the researcher, but also a belief that the affectedness should go hand in hand with a thorough and meticulous self-reflection on the effects of the situatedness and thinking technologies available to the researcher. In terms of ontologies and ethics the project is carried by a deeply

personal desire to think through new ontologies and ethics for understanding cancer, death and dying beyond current humanist and scientific frameworks. In the context of my research, the Western humanist tradition appears as problematic, because it is so pervaded by, on the one hand, inherently dualist Christian or platonic discourses, constructing the dead body as just base matter, nothing but a launch pad for the "immortal soul". On the other hand, humanism's other alternative, a modern scientific outlook, constructs the dead body as just a machine without the "ghost".[1] In the end this comes down to basically the same figure of degraded matter, inherent in Christian or platonically tinged discourses. Neither ethically nor ontologically can I accept to degrade my dead beloved's body and ashes to the state of base matter according to these schemes of thought, and by extension no other dead or living bodies either. For these reasons, I turn to posthumanist frameworks, in particular feminist neovitalist ones for inspirations to carve out new stances.

Conclusion

The humanities scholars whom I first and foremost meet are those who – like me – moved to the fringes because of disciplinary myopias and tunnel visions of classic humanities. So I can make myself accountable for what happens on the feminist profiled parts of these fringes, and this is what I have done, so far, in this chapter. In conclusion, I will ask if and how the outlined processes of transformation may affect not only the fringes, but perhaps also the mainstream of the humanities.

As already mentioned, it is obvious that mainstream humanities are, indeed, affected. The general debates, which have characterized Western neoliberal universities for decades, on the so called "crisis" and "survival" of the humanities, as well as the troubled questions of commercialization, commodification and applicability of humanities research and employability of humanities candidates do definitely indicate that previously stable foundations for the humanities are currently caught up in processes of erosion. It is also obvious that – intertwined with the critical exodus from the humanities, the one to which I belong – there has also been a more "forced" exodus due to lack of job opportunities. Many institutions for foreign languages, literatures and ancient philologies have been closed down in recent decades at humanistic faculties in many countries, and candidates with these specialties have often had to fight hard for job opportunities outside of the university.

Individually, this situation has been difficult for many humanities candidates, but this is not what I will discuss here. Instead, I will ask if the two partly intertwined and partly different waves of "migration" from the humanities, the more critical and the more forced one, together can be seen to make up so massive a

[1]The image of the "ghost in the machine" refers to critical discussions of the Cartesian body-mind dualism among others by philosopher Gilbert Ryle (1949).

move to the fringes that it is possible to gather a critical mass of former humanities scholars wanting to generate new opportunities for the humanities in terms of transforming them into posthumanities?

Moving to the margins is of course only a move to the *margins*, when seen from a fixed position in the center. Moving to the margins can, from another perspective, be considered as a move to borderlands, where humanities theories, approaches, methodologies and ethical stances meet theories, approaches, methodologies and ethical stances of other faculties, disciplines and job sectors. The move to the margins can, if it is massive enough, also end up in a decentering and deconstruction of the center. So it is perhaps not too far out to ask if classic humanities are on their way to metamorphose into postdisciplinary endeavors, already because a mass exodus is eroding the center?

Anyhow, I would like to see the humanities metamorphose into posthumanities and start grappling seriously with the human subject's process of becoming posthuman. I would also like to see the emerging posthumanities become part of postdisciplinary endeavors involving entanglements of human, social, medical, technical, and natural science starting points. In this process, I would like to see the social, medical, technical, and natural sciences show respect for the insights and tools of the (post)humanities, and vice versa. To show such respect and let synergies unfold freely among the different domains of scholarly knowledge production is a multi-layered process. One discipline or faculty should not claim the final authority. It is important that the postdisciplinary process is happening in a manner, which does not neglect the insights of any of the involved domains – and make them have equal weight in formulation of research problems and framing of research. The posthumanities do definitely have a place in this new landscape of knowledge production. So perhaps should we who for various reasons left the humanities for the fringes, start looking more closely at each other and find out what we may or may not have in common!

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Chapter 3
Posthuman Sexuality: From Ahumanity to Cosmogenic Desire

Patricia MacCormack

While feminism has grappled with the disassembling of the majoritarian phallologocentric subject, posthuman and transhuman theory have shown a problematic acceleration of certain tropes associated with historically dominant subjects, rather than offer material and ethical alternatives, using fetishisation and assimilation of alterity to further their phantasies of immortality rather than authentically challenge configurations of life. However there are ways in which an ethics of posthuman sexuality coming from a feminist history can be both accountable and avoid the perils of superficial posthumanism via certain instances of desire. This chapter will explore the trajectory of posthuman desire implemented through Continental Philosophy and end with a variety of configurations of desire beyond humanism, but also beyond the phallologically driven biotech fetishism of some posthumanism. The posthuman shows we can no longer be trustworthy of studies of the human, of humanism or even of the dispelling of the myth we were ever human.

Posthuman sexuality in its primary repudiation of the object/subject sexual dialogue, reconstitutes desire not as between two, or subject and thing, but as affective (and thus ethical) force: "desire is constituted before the crystallization of the body and the organs, before the division of the sexes, before the separation between the familiarized self and the social field" (Guattari 1996, 153). Similar to Guattari's claim that desire belongs to the before and beyond of the subject, Kristeva's semiotic emphasises the before and the beyond the symbolic which is where feminist desire is found (but never revealed). Kristeva argues that a-signified drive and thus a-signifying image is not infantile (pre-human) but schizoid (post-human), "de-structuring and a-signifying machine of the unconscious … schizophrenic flow … [not] schizophrenic blockage, is a structuring and destructuring practice, a passage to the outer boundaries of the subject and society. Then – and only then – can

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_3

it be jouissance and revolution" (1984, 17). The posthuman in its rupturing of causal and chronocentric evolution, including desire as evolutionarily more refined, is outside of time into a place of encounter with the imperceptible but materially affective outside. Perhaps also this is why my position as a feminist of posthuman sexualities will be guilty of what Cary Wolfe states of "That paradoxical observability of the unobservable, the communicability of the incommunicable … [which] ought to sound familiar to students of romanticism" (2009, xxxii). Seemingly Foucault is similarly romantic: "A manifest truth" writes Foucault

> disappearing not when it is replaced by another one that is fresher or sharper but when one begins to detect the very conditions that made it seem manifest; the familiarities that served as its support, the darknesses that bought about its clarity, and all those far away things that secretly sustained it and made it "go without saying" (1994, 447).

Foucault's claim balances the wonder of the Romantic imperceptible, embracing Outside, with the required acknowledgement that the way reality is constituted, and by whom, is a flawed result of regimes of power and masquerades of observable exteriority. This directly correlates with the way "woman" has fallen Outside both phallocentric discourse and also navigates the desire to be Outside without being silenced or locked there by patriarchal forces. Wolfe's posthumanities, via sexualities and animalities, tends toward Jacques Derrida, Judith Butler, Bruno Latour and what could be argued a more "American" theoretical framework which privileges performativity in reference to sexuality, and fetishisation in reference to animality. Wolfe, in his discussion of the place of ethics in posthuman theory, explores the status of biotechnology, another cyber-fetish site for posthuman becomings. Many other posthuman theorists tend toward Levinas, Derrida, Latour, Haraway and Hayles while interestingly those theorists who are more aligned with my framework, such as Rosi Braidotti, Anna Hickey-Moody, Elizabeth Grosz, Claire Colebrook and Felicity Colman seem to shy away from posthuman theory or are more critical of it, emphasizing French feminism and the Nietzschian, Bergsonian, Spinozist, Kristevan, Irigarayan and Deleuzio-Guattarian line. This is the trajectory of posthuman feminism via which my understanding of posthuman sexuality emerges.

In a claim which both dispels all sexuality and by doing so opens up desire as an infinite everything, Foucault states "it is not sufficient to liberate sexuality; it is also necessary to liberate ourselves from the notion of sexuality itself" (2000, 245). According to Braidotti (2013, 98–100) the key determining feature of posthuman sexualities comes from the shift from isomorphic binarism, where the world and concepts are bifurcated into seeming oppositional categories which conceal the dominance of one term perpetuated over the failure of the other term to achieve equivalence, to rhizomatic connectivities. Benhabib takes three elements of post-modern thought (roughly translatable into posthumanism) as problematic when formulating a feminist ethics for selfhood, which resonate with posthuman philosophies within an explicitly feminist context due to their address to the most emphatic of all isomorphic dominant terms, man. These are the death of the subject, what she calls The Death of Man, the excavation of the truth of history or

The Death of History and the death of the desire to master the self and the world by knowing everything, The Death of Metaphysics (1992, 211). Pepperell reflects on what could be called an additional death belonging to the Posthuman Condition, the death of the discrete episteme in posthumanism, where science meets philosophy. He sees three key questions central to both science and philosophy become defunct within the posthuman condition: "1. That there will be an answer. 2. That if there were an answer it would be satisfactory. 3. That if the answer were satisfactory it would be because it provided a final cause for human existence. This final cause would not be open to any further analysis of the kind that might ask 'what is the cause of the final cause of human existence?'" (1997, 29, original emphasis). Two major elements are responsible for, or result from, the death of the subject. These are; the figuration of an embodied, corporeal self (as opposed to the transcendental or metaphysical) and the need for different types of subject (always housed in different types of bodies) to become viable and ethically considered in culture, particularly phallologocentric, white, capitalist culture. This, according to Guattari, would be the machinic connectivity inherent in posthumanity which replaces the diachronous finite couplings of oppositional, binarised and asymmetrically empowered traits. "A 'machinics' breaking with [capitalist modes of thought] would imply a refusal of the dichotomy between material processes and semiotic processes. It would be brought to consider the deterritorializations of time and space only in connection with a new type of assemblage of enunciation, new types of faciality traits, refrains, relations to the body, sex, the cosmos" (Guattari 2011, 105).

The idea of subjectivity is vast in philosophy, yet constitutes any referent to "one's" sexuality, as subjectivity in opposition or identical constitutes sexuality, and even queer grapples with "object" and "self" as acting constituents, but its ability to cross epistemes and indeed be the major focus of almost every question asked in every field, namely "who or what am I?", psychically in psychoanalysis, biologically in science and medicine, metaphysically in philosophy, elucidates the importance of being a subject in order to know what kind of subject one is. Crucially however, sex and sexuality distribute themselves within each of these epistemes, so clearly haunt, transgress and challenge all knowledges in their capacity to emerge as the thought of the body – that is, the flows and intensities from Outside by which bodies coalesce but which are not discrete and operational in any logical or demarcated manner. Many feminists, especially those who are suspicious of the representation (or lack thereof) of women in philosophy and the turn to the hyper technologised male of posthuman fetishism point to the redundancy of the question "who or what am I?" when it comes to women. What does the death of subjectivity mean in postmodernism for those who never really had a self-defined subject to begin with? For many feminists the question should have been acknowledged before posthumanism took flight and made us all dissipative molecular constellations. Many anxieties follow this question, such as whether the death of subjectivity by male theorists is an appropriation of any subversive potential women had by being not fully ingrained by that idea of "something to lose", or whether the death of subjectivity means the wiping over of any history of

oppression women may want to remember specifically due to their being women, an anxiety Benhabib explicitly addresses in her argument on the death of the subject. For in calling the death of subjectivity The Death of Man Benhabib points out that only "man" or male subjectivity has anything to lose through postmodernism. Man's desire was so exhaustively catalogued while women's was yet-to-come, an arrival that in a liberating way, happily never occurred. By situating the post-modern post-subject posthuman within the two primary locations of corporeality and difference, postmodernism is giving women what they have always and already been condemned to – entrapment within their own flesh that precedes any concept of self and is spoken for and about by others, and a terminal "othering" from normalised axes of acceptability. The desire of post-modern subjectivity in many ways is a desire to "Become-Woman". Ironically (and as Haraway tells us, cyborgs always speak ironically, (1990, 149)) Lacan's perpetual question of "what do women want" coming from his anxieties over how they can be defined in order that he may be defined returns in posthumanities in the paradigmatic shift from the question "who is the subject" (for feminists that never was, for posthumanities that no longer is) to "how does the subject desire?" For here is found a profound alteration in concerns both for feminists and posthumanities – to define the subject is a humanist project, to understand the subject as an expressive and affected conduit in perpetual relations with other expressive and affected entities via desire is the foundation of corporeal feminist posthumanities (see e.g. MacCormack 2009).

One of the most promising and contentious, critiqued and celebrated elements of projects of becoming is becoming-woman. It represents the pinnacle of Benhabib's anxieties about the death of subjectivity, where the death of man has the potential to be the appropriation of "woman" by men. Such a strategy enhances the subversive qualities of being oppressed and disdainful to dominant, desirable "male" subjectivity without being accountable for this oppression or aware of the realities of living in a perhaps subversive but more pertinently often painful, marginalised and most remarkably, male-given, male-articulated body. In a cynical explication, I could suggest the desire to enter into a becoming-woman remains sufficiently within a binarised subject-object dialectic but at least sees the oppressed term not as an object for consumption, objectification or domination, but as an intensity or threshold which offers opportunities for escape from phallogocentrism. This problematic locus is where much of the arguments between trans subjects who wish to retain an operational binarised understanding of gender and so-called radical feminists occur. But the important term seems to be increasingly, from a posthuman context at least, less about "women" and more about "desiring becoming". The sexuality which is not desire for an object-term but desire for metamorphosis itself, is more valuable than the mythologised phantasy of the term woman. And at least women are (tactically) human enough to respond, albeit via minor language, and thus are not co-opted in the revolting manner much posthumanism perpetrates on nonhuman animals through assimilations of thoroughly human apprehensions of nonhuman behaviour and systems. From fighting for equality, safety in our bodies and the ability to articulate our own selves the idea that our bodies are now fashionable theoretically, and ripe for assimilation by

the logic that marginalises us in the first place is the current trend in posthuman theory. Any desire to transform subjectivity potentially fails to address these problems, because of the speaking position the thought presumes no longer exists, may still exist or be important (hence posthuman which, when espoused by male theorists, potentially believes "female" is a position no longer implicit and hence no longer pertinent). The importance of maintaining an address to becoming-woman, despite its numerous valid criticism, is twofold. First where does the specificity of a lived woman's body and history go when the desire to become process, non-fixity and becoming replaces the idea of an historical embodied self? This may help us reintroduce political materialism to posthuman experimentation. Second, does the creation of a constantly altering transforming self relinquish concepts of accountability, ethical responsibility, and include responsibility for history? My response to these questions is thus: The activity of locating and transforming through "others within the self" produces an active engagement with:

1. Concepts of other not limited by and not entirely deposing of the borders of the flesh; an embodied self which actively desires others as molecular not molar, either the other in the self or other bodies which themselves have their own boundless others, such that all specificities of all concrete others are actively engaged with at every moment; a self which identifies the borders of the flesh and its histories but does not see them as indicative of wholes or organisms for the future due to such borders. This is an ethical Spinozist mapping of the desiring body.
2. Concepts which deconstruct, sometimes violently, any notion of the sanctity and integrity of a subject created to resemble a valuable capital commodity, be it over-valued male subjectivity or objectified female biology. This repudiates all oppositional sexual dialectics.
3. The nature of what is being deconstructed so that history and accountability are always in process with transformation - we can transform to something else but we transform from whenever we transform to. We may all be queer now but we do not forget what certain constitutions of sexuality did to minoritarians.

In another ironic turn, then, posthuman "women" are, like Monique Wittig's lesbians (1992, 13), not actually women, because they are delivered from an oppositional structure. Deleuze and Guattari point to the molar woman, the little girl robbed of her own body's potential, who could have become woman molecularly, piece-by-piece with indeterminate specificities. Through phallologocentric intervention, regulation, or as Grosz calls it, "culture's most intensified disinvestments and recastings of the body" (1994, 174–175), this little girl ceased becoming and is now being as stagnant, as molar-woman. Woman, according to Deleuze and Guattari

> is defined by a relation of movement and rest, speed and slowness, by a combination of atoms, an emission of particles: haeccity. She never ceases to roam upon a body without organs. She is an abstract line, or a line of flight. Thus girls do not belong to an age group, sex, order or kingdom: they slip in everywhere, between orders, acts, ages sexes; they produce n molecular sexes on the line of flight in relation to the dualism machines they cross right though. The only way to get out of the dualism is to be-between … (1987, 276–277)

What Deleuze and Guattari fail to express is that this constant un-being of woman, who promises so much for becoming, exists at a place or a be-between that woman neither made for herself nor resides in willingly. Feminism has attempted to re-appropriate the in-between and abstractedness of woman's representation in culture in order to affirm female being and take away the power of naming-her-there, which phallologocentrism exercises. Feminism's re-appropriation of woman's other-ness is as much about a will to power and attaining a voice as it is a making valuable of any position woman finds herself in. Inherent in this fight against subjectification is the inability to speak her desire. Sexuality, or rather, desire, is the force of femininity, not the body per se. What Deleuze and Guattari do is make desirable the position without acknowledging the importance of speaking and valuing the position in the process of its becoming desirable. Woman needs to speak her own subversion, as much for the speech as for the subversion. As Braidotti points out

> The problem for Deleuze is how to disengage the subject position "woman" from the dualistic structure that opposes it to the masculine norm, thereby reducing it to a mirror image of the same … To put it in more feminist terms, the problem is also how to free "woman" from the subjugated position of annexed "other" so as to make her expressive of a different difference, of pure difference, of an entirely new plane of becoming, out of which differences can multiply and differ from each other. Here the focus is more on the experience and the potential becoming of real life women, in all of their diverse ways of understanding and inhabiting the subject position "woman" (1994, 115).

We are in a similarly dubious situation with reference to posthuman sexualities if we take the cyborg turn, however. Many cyber-theorists, and organisations, such as Humanity+ (formerly the World Transhumanist Organisation) which attempt to think transhumanist futurity such as that of Extropy ethically and accountably, embody (or disembody) a commitment to the human which has overcome humanness primarily through overcoming finitude. In this way definitions of subjectivity also ceases to be a spectre, but this futurity necessarily repudiates the now beyond its usefulness for an infinite tomorrow(ing) so material immanence, the newness of any dividuated life's existence in relation with that of others, is maligned. Extropy could be described as the cyber-biotechnological version of humanist, transcendental practice, while Humanity+ exhibits anxieties about asymmetry in access, distribution and manipulation. Just as certain theorists see the posthuman as coming from an outside imposed upon the base material of the human, so transhumant theory insinuates this cannot be enough, as if there is an inherent flaw in human materiality. A paradigmatic equivalence could be made here between phallologocentric economies of lack, where the absence of the phallus or its threatened truncation or castration misses entirely the multiplicity and metamorphic morphological mucosity of the vulva (Luce Irigaray) and alternate ways of reading the body at all (Antonin Artaud and Deleuze and Guattari). The symbolic to asignifying genitals (addressing sexual difference as the first step away from the majoritarian human) seem almost quaint when thinking the new grand narrative of the human itself, thinking it in order to unthink it, expunge it from its relationship with the humans who, at worst, question the category of the human only in order

to exclude any limitations or accountabilities in reference to immanent existences of other lives, including other "human" lives, be they considered majoritarian human or minoritarian flesh. In the deification of biotechnology the cyborg's attractive elements which can be found in the most rudimentary feminist, queer, post-colonial studies – the incomplete, the hybrid, the germinal through denial of access to signifying systems – are offered as a future design for the infinite human. It is as if all the very characteristics which made minoritarians abject have been apprehended by biotechnology with an adamant forgetting of their former use as tools of oppression. Why signifying systems hated the minoritarian is why they love the cyborg. This is primarily due to the fact that both repudiate the human. But criticisms of the desire to enter into a becoming-cyborg or becoming-woman remain – a perceived aversion to material specificity, the privileging of an ideational projection over a specific, singular and unique event of existence, a perpetuation of the humanist turn to defining (even if via non-defining), fetishism and fear borne of the fact we are scared because we never were human in the first place. If desire and sexuality are the jubilant loci for posthumanism which addresses feminist concerns, then they are also the loci for fear for the majoritarian. This may be why post and transhumanist philosophies are still relatively fine with reproduction (in the bed or the test tube) but recoil when having to deal with here-and-now concerns, such as the lives which are (without qualifying what they are) and the cessation of human reproduction, proposed so elegantly by a more material and ethical posthuman movements, such as the human extinction movement and the Church of Euthanasia. If the modern age delivered sexuality from reproduction, the posthuman age has turned reproduction into a desire to live forever, sterilising carnality by almost denying its importance.

Along with the perhaps seemingly nihilistic sounding, but utterly affirmative, vindication of human extinction and care of immanent and living life posthuman sexuality performs over an immortalising obsession with lives yet to come into being, posthuman sexualities have diversified toward monsters, spiritualities (without theism) and on a grander scale, a cosmic understanding of connectivity that could be described as cosmogenic. For this reason the word posthuman has been challenged, first with transhumanism but now the "Ahuman" is used to express a here and now excess which is the already posthuman inherent in concepts such as jouissance and desire (see MacCormack 2014). Ahuman theory knows neither future-fetish nor nostalgia, it reputes all bifurcations - of object and subject, human and animal, fictive and factual – via what Irigaray would call mucosal desire, and Serres a cosmogenic mode of interaction. Where the posthuman fetishising of others, critiqued in becoming-woman and animal but also any co-option of a non-human or idea which is utilised as a cipher toward posthuman desiring, is deeply problematic, ahumanity seeks the liberation of "human" life from human traits and definitions – which are increasingly destructive and malignant in relation to the connectivity of life on earth, without assimilating any one of those other forms of life. Irigaray utilises a desiring relationship with angels, which offers a fascinating way of introducing spirituality as a mystical but deeply material ethics independent of God (or Gods, or goddesses), as a schema for encounters with Outside, but

devoid of utilising a subaltern to achieve these encounters: "The consequences of such nonfulfillment of the sexual act remain … to take only the most beautiful example … let us consider the angels. These messengers are never immobile nor do they ever dwell in one single place. As mediators of what has not yet taken place… these angels therefore open up the closed nature of the world, identity, action, history" (1992, 173). Angelic love is formed of what Irigaray calls a mucosal consistency. It finds itself alighting upon fabulated creatures. This aligns with the turn to teratology by such theorists as Haraway, Braidotti and MacCormack in feminist posthumanities, whereby the fabulated creature demands imagination in reference to means of escape from fetishising posthuman discourses which perpetuate phallic compulsions. Irigaray utilises the mucosal model to foil the privileging of binaries, privileging of the visual, and a repudiation of desire and abjection: "Nor will I ever see the mucous, that most intimate interior of my flesh, neither the touch of the outside of the skin of my fingers, nor the perception of the inside of these same fingers, but another threshold of the passage from outside to inside, from inside to outside, between inside and outside, between outside and inside" (Irigaray 1993, 142).

The angel both awaits as the not yet and is already the quickened with us. "Here the body effaces itself in order to call forth another body, here the body is annihilated and becomes a tiny pile of ashes in order that the existence of other bodies may rise up, the immense legion of angels of absence" (Serres 1995, 45). The self becomes ashes from the burning of ecstasy, and phoenixes pluralized. This stands in marked juxtaposition against compulsion toward reproduction (of the same, of humans, of acts, of identities, of perception) and the manic need for extension of life, the my of my life affirmed in the my of my consistent perception of exhaustible meaning beginning with who I am and what I desire, all defunct in posthuman sexuality. Cosmogenics interrogates and relishes the infinite teeming and potentialities of the immanent Universe which are inherently present in all territories without cyborg fantasies or devolutionary co-options. Cosmogenics encourages expressivity in alterity as infinite intensities, and openness to affect, all without the imposition of structure. This is desire as ecstatic and activist, a Spinozist ethical project. From angels and monsters to the unbearable imperceptibility of all as desire and desire as all, feminist posthuman sexualities trace a chaos of desire to elucidate the ways feminism was always both posthuman and ahuman, and tactics by which experimental and celebratory posthuman sexualities can facilitate ethical affects to open the world to all expressions of life.

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Chapter 4
Material Feminism in the Anthropocene

Stacy Alaimo

Two works of contemporary feminist art epitomize the vexed relations between feminism and environmentalism that have propelled much of my research. Barbara Kruger's black and white photo, featuring a woman lying upside down with leaves over her eyes, overlaid with the caption, "We Won't Play Nature to Your Culture," illustrates the postmodern feminist rejection of the dualisms that align "woman" with mute, passive, nature.[1] The "we," a collective subject, voices a political stance that distances itself from the docile, degraded image. While that feminist critique – that charismatic power of revolt – is invaluable for gender politics, environmentalists may be troubled that the ground, the leaves, and what used to be known as nature, is once again transcended by the voice and the viewer. The caption calls the collective feminist subject to leave the ground behind, hailing us in a way that makes the earth a background[2] or resource for the active political subject. Cuban-American performance artist and "earth-body" sculptor Ana Mendieta's performances and photographs are more ambivalent about the relation between "woman" and "nature." The cover of my book *Undomesticated Ground: Recasting Nature as Feminist Space* (2000), features one of Mendieta's works from her "Arbol de la Vida/Tree of Life" series.[3] The photograph shows Mendieta, naked and covered with mud, up against a tree, her arms raised as if the

[1]To see this and other images, visit "Barbara Kruger," "The Art Archive": http://www.arthistoryarchive.com/arthistory/feminist/Barbara-Kruger.html. Accessed 25 November 2015.

[2]For an analysis of "backgrounding" as a means through which both "woman" and "nature" and others have been exploited, see Plumwood 1993.

[3]This photograph can be seen online at the GreenMuseum: http://greenmuseum.org/c/aen/Images/Ecology/arbol.php. Accessed 25 November 2015.

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_4

police had commanded her to put her hands up. This photograph dramatizes how the Western alignment of "woman" and "nature" has fixed females into a compromised position, where we are not quite human. Women, especially women of color, have been marked as creatures of mud and forest, a petrifying association with a degraded nature. And yet, when read alongside some of Mendieta's other artworks that depict vagina-like sculptures she creates in the earth and then sets on fire, we sense that both identification and rejection are simultaneously in play. Mendieta, inhabiting her own body as a medium (via performance art) plays with the very linkages that Kruger's feminist collective subject rejects. Even as Mendieta clearly depicts how the very definition of "woman" in the Western tradition has mired her – and especially her sexuality – in a besmirched "nature," she also registers the sensual, palpable, erotic, pleasure of being a body and being overcome by natural substances. The self in these performances is neither a rational, transcendent humanist subject nor a confidently voiced feminist collective, but someone who is embodied, intelligent, and agential. In terms of intersectionality, it is important to note that Mendieta's Cuban heritage and her connection to Santería, a syncretic religion that mixes West African, Caribbean and Catholic traditions, infuse her artistic engagements with the earth. A history of racist and colonial alignments of people who are neither Anglo nor Western with a degraded proximity to nature indicate that Mendieta's explosions of these associations do not target gender ideologies exclusively. Moreover, the tradition of Santería may have offered Mendieta rich modes of thinking otherwise, routes out of rigid Western grids. Mendieta creates a potent mix of affirmation and critique that illustrates how complicated the conceptual terrain of "nature" has been for feminisms.

During the 1990s, when I was writing *Undomesticated Ground*: *Recasting Nature as Feminist Space*, feminist postmodernism and poststructuralism, as well as queer theory and critical race theory, were deconstructing, subverting, and contesting calcified categories of gender, race, and sexuality. Social constructionist critiques of cultural definitions of "woman," for example, aimed at dislodging narrowly gendered scripts and identity categories. Indeed, feminist poststructuralism insisted, rightly, that any definition of "woman" would necessarily be restrictive, provisional, and performative – not simply an unbiased mirror of a preexisting reality, but something that itself shapes reality and reduces possibilities. Even as social constructionist or feminist poststructuralist critique was crucial for social change, it tended to leave the nature/culture opposition in place. In feminist theory, for example, what I call a "flight from nature" prevailed, as the critique of essentialism entailed distancing feminism from the overloaded concept of nature. This is understandable, of course, as the concept of "the natural," had long been waged against women, justifying social inequities and harms by way of biological essentialisms. At the same time, many ecofeminist writers and activists affirmed the idea that women were more aligned with nature, or as Val Plumwood, put it, disparagingly, that women were "the angels in the ecosystem" (1993, 9). Neither uncritically endorsing an ostensible connection between the ridiculously broad terms "woman" and "nature," nor distancing feminist philosophy from the concept

of nature seemed productive, effective, or desirable to me. As a poststructuralist feminist myself, I sought the destabilization of any set definition of "woman," but as an environmentalist I feared that the critique of essentialism sometimes mirrored humanist trajectories of transcendence from corporeality, biology, animality, and "nature." Searching for a way out of this dilemma, I investigated how North American women writers, activists, and theorists from the early 19th century to the late 20th century transformed conceptions of nature for feminist purposes. Immersed in poststructuralist and postmodernist feminist theory, I nonetheless argued that it would be more effective to interrogate and transform conceptions of nature rather than to leave them in place, like abandoned explosives. Indeed, as a "gender minimizing" rather than "gender maximizing" feminist,[4] I was ecstatic to discover that not only did many women inventively recast specific concepts of nature but that they conjured up rich, generative alternatives to essentialisms by imagining nature as an undomesticated space for feminisms that subverted gendered, and sometimes racial and class hierarchies and identities. In short, while much feminist theory allowed the concept of nature to remain as the bedrock of gender (and racial) essentialisms, nearly two centuries of North American women's writing posed "nature" as an alternative imaginative space that was free from the rigid dualisms of the domestic sphere. For example, late 19th century Darwinian feminists disputed blinkered societal conceptions of gender by insisting evolution demonstrates that gender and sexuality, not unlike species, fluctuate and transform. They argued that what is "masculine" and what is "feminine" is arbitrary and variable. Whereas confinement is key to the domestication of both women and nonhuman creatures, scaling up to immense timescapes and landscapes opens undomesticated ground. As modernist poet Mina Loy puts it so beautifully, "There is no Space or Time/Only intensity, /And tame things/Have no immensity." (1996, 3) The Darwinian feminists argued that tracing the vast expanse of time in evolutionary theory dwarfs the fleeting, flimsy social categories of "man" and "woman." For other writers, vast expanses of space liberate women from the confines of gender. In the early 20th century, Mary Austin (1907) imagined the deserts of the American West as places to shed rigid gender norms, when she depicts the "Walking Woman," whose excursions through undomesticated territory enable her to elude the restrictions of gender and sexual orientation. The Walking Woman epitomizes the freedom of perpetual motion, not stasis. Marxist-feminist theorists and writers of the 1930s argued that it was culture, not nature, that produced women as inferior entities, and that gender hierarchies were themselves unnatural. In short, I discovered a rich archive of feminist thinkers who turned to nature as a space outside the gendered domestic sphere, a space where gendered dualisms, hierarchies, roles, and values could be left behind. To what extent these visions of nature as undomesticated, ungendered space were exclusively cultural, discursive contestations and to what extent particular physical landscapes and other material forces affected these constructions is an open

[4]See Snitow (1990) for definitions of these terms.

question. Yet it is not hard to imagine, in the case of Mary Austin, who wrote about both the indigenous cultures and the open landscapes of the American West, that the rough terrain as well as the indigenous cultures that managed to survive those harsh climes had some impact on her philosophy. Her belief that people should adapt to the land rather than reducing it to a tamed resource for the domestic realm, allied environmentalism with a feminism itself adapted to the mythologies and the landscapes of the American West.

My method in *Undomesticated Ground* was primarily that of a cultural studies based mode of discursive and ideological analysis, based on the concept of "articulation" as put forth by Stuart Hall, Ernesto Laclau and Chantal Mouffe. I focused on how women were re-articulating specific conceptions of nature, taking operative terms and transforming them or connecting them for feminist ends, whether those be reproductive freedom, economic equality, or queer desire. I became struck by the limitations of this methodology, however, as the methodology itself remained within the nature/culture dualism. Nature could only be a concept, a discourse, an ideological term that culture conjured up. So, after completing *Undomesticated Ground* I began a long search for alternative methodologies – primarily in feminist theory, environmental studies, and science studies – that would allow for the agency and significance of materiality. This search resulted in the collection *Material Feminisms* (2008), which I edited with Susan J. Hekman, as well as my book *Bodily Natures: Science, Environment, and the Material Self* (2010). Before discussing *Bodily Natures*, however, it may be useful to return to Kruger and Mendieta. The art by Kruger and Mendieta illustrate the movement from a postmodern critique to a material feminist engagement. The style of Kruger's work alludes to advertising and the postmodern circulation of images, or simulacra, which in Jean Baudrillard's terms, are those images that have no connection to reality. Kruger's parodic postmodernism critiques Western consumerist culture and its sexism from within the belly of the beast, being itself the sort of image it critiques. The minimalist, almost abstract black and white image of the woman's upside down face with leaves over her eyes is almost purely conceptual – it would be foolish to interpret it as leading us toward an actual woman somewhere because – and that is the point – this is a parody of an idea of woman circulating in culture. An idea that impacts women, surely, but that no living female could actually inhabit. This is a vital mode of feminist critique, which remains essential. Indeed, in early 21st century thousands of feminist memes perform powerful cultural work as they circulate through social media. Mendieta, however, leads us somewhere else. Because she is herself performing in the scene, her photograph invites us to engage in a more embodied sense of the fleshy, muddy, experience of body touching tree and, at the same time, to understand how this image alludes to and circulates as a conception of "woman" and "nature." Notwithstanding the ambiguity, the ambivalence, and the multiple valences and traditions that emanate from Mendieta's performance, the art can be understood both in terms of its critique of the denigrating alignment of woman and nature and as an affirmation of material connections and corporeal understandings.

The essays in *Material Feminisms* as well as the work of many other important theorists that could be termed material feminists, demonstrates the broad political importance of reconceptualizing materiality so that it can no longer serve as the bedrock of essentialism nor as the passive stuff of the world there to be exploited. A thorough reconceptualization of the material world, which would include a recognition of the significance of material agency, is essential for both environmentalism and feminism, but especially for the volatile sites where the two converge. New materialism, which is developing not only in theoretical but also in activist movements, enables us to access the lively and often unpredictable world we inhabit without conceiving of "nature" as a passive resource for human use. In *Bodily Natures: Science, Environment, and the Material Self*, I analyze the environmental health and environmental justice movements, including the citizen scientists who must discern, track, and negotiate the unruly substances that move across bodies and places. "Nature" is not something external nor something eternal, but instead, the immediately present, ever-changing, materiality of the world and ourselves. Thinking materiality as agential, thinking bodies as continually transforming, and thinking across the bodies and places in ways that highlight their interactions, culminates in what I call "trans-corporeality." Trans-corporeality entails a radical rethinking of the physical environment and human bodily existence by attending to the transfers across those categories. Rather than taking another feminist flight from nature, trans-corporeality begins with the subject in place, where the materiality of xenobiotic substances, consumer products, invisible flows and networks cut through the ostensible outline of the self, transforming the human subject into a posthuman subject who is always already the very stuff of the world. As a type of material feminism, trans-corporeality is indebted to Judith Butler's conception of the subject as immersed within a matrix of discursive systems (Butler 1992), but it transforms that model, insisting that the subject cannot be separated from networks of intra-active material agencies (Barad 2007) and thus cannot ignore the disturbing epistemological quandaries of risk society (Beck 1992).

As the material self cannot be disentangled from networks that are simultaneously economic, political, cultural, scientific, biological, and substantial, what was once the ostensibly bounded human subject finds herself in a swirling landscape of uncertainty where practices and actions that were once not even remotely ethical or political matters suddenly become so. Trans-corporeality positions the subject as interconnected with the substances of the material world, which entails new models of ethics and politics that cross conventional domains and interest groups as they traverse vast expanses. Thinking the subject as a material being, not as a transcendent, utterly rational subject but as a being subject to the agencies of the compromised, entangled world, places us within a posthumanist and environmentalist domain. Trans-corporeality is a mode of posthumanism that begins from the unacknowledged site of human corporeality, insisting that what we are as bodies and minds is inextricably interlinked with the circulating substances, materialities, and forces of the wider world. People who suffer from multiple chemical sensitivity are the quintessential trans-corporeal subjects, as they experience the strange agencies that lurk in seemingly innocuous objects, such as couches or

fabric softeners. When they experience nausea, headache, or panic from these encounters, they understand that their physical, mental, and emotional well-being is not separate from the "environment," but instead, that places, substances, and consumer objects affect them in penetrating, even constitutive ways. Ironically, a massive heap of things that that have been produced for consumerist desires, the production of which has entailed the destruction of many nonhuman creatures and habitats, also produces networks of harm to humans at the places of extraction, manufacturing, consumption, and disposal. Some of these temporally and geographically extensive networks of harm can be researched and definitively mapped; others can only be determined within various degrees of likelihood, and others only imagined. What is distinctive about trans-corporeality, however, is that the (post)human does not trace these networks from a safe, outside position but always from within. The trans-corporeal subject does not occupy the epistemological position that enables what Donna Haraway (1991) called the "god trick" of "infinite vision," but is instead, not only situated within but constituted by networks of material agencies. When we imagine that the world is a resource that we must preserve or sustain in a utilitarian fashion, holding "it" at arm's length, we deny our own permeability, vulnerability, and bodily nature. But imagining we are not at risk from the manufactured world does not make it so. Moreover, trans-corporeality is not at all a spiritual sense that "everything is connected," but instead, a call to engage in the political knowledge practices that reveal the specific networks of exploitation, risk and harm that capitalist consumerism attempts to conceal. Such knowledge practices are themselves ethical and political matters.

As hydraulic fracturing for natural gas is a noisy, highly visible operation, not only in terms of the on-site equipment but also in terms of the astonishing volume of truck traffic it requires, it draws attention to itself in ways that the more normalized toxic conveyors such as agribusiness do not. The movements against hydraulic fracturing, or fracking, in the US have generated new populations of trans-corporeal subjects, as fracking has moved into residential neighborhoods, polluting the air and water, causing not only illness but the realization that the individual is a material being affected by the toxic interchanges in which s/h is immersed. Kim Triolo Feil (2013), an anti-fracking activist in Arlington, TX, notes on her blog that she has become "ultra sensitive to pollution since urban drilling has come to Arlington TX." She assembles on her blog, "citizen reports on dead cows… dead deer… dead birds… and dead people," noting "the common theme is that they occur near fracking sites." While fracking activism began by emphasizing the effects on human health, environmental organizations such as the National Wildlife Federation and The Center for Biological Diversity are revealing the threats to nonhuman lives. The toxic bodies of industrialized consumers, however, not only suffer harm, but are also implicated by their own use of energy that is causing climate change. Trans-corporeal maps may chart both the radioactive and toxic harms done to the posthuman subject as well as the harms done to the habitats, environments, nonhuman creatures, and specific human groups – harms that the industrialized consumerist lifestyle wages against the rest of the world. The carbon footprint is an important mode of calculating such harms, but it needs

to be accompanied by other vectors, calculating the dissemination of toxins and waste as well as the destruction of habitat. Trans-corporeal ethics and politics then, encompasses nearly everything a person eats, drinks, uses, purchases, and discards – daily life becomes a deeply charged site of political epistemologies and ontological ethics, which entail the search for trustworthy information, the sense of solidarity with others who attend to the ethical ramifications of the most seemingly mundane matters, and the embrace of an impossible ethics of nonharming. If consciousness-raising showed feminists that nearly every institution, built structure, academic discipline, social role, or everyday activity is profoundly gendered, then the recognition of trans-corporeality demonstrates that nearly everything the embodied posthumanist subject does or does not do is a matter of environmentalist praxis. The trans-corporeal subject is akin to Rosi Braidotti's "ethical subject of sustainable becoming," who "practices a humble kind of hope rooted in the ordinary micro-practices of everyday life" (2006, 278).

While some material feminisms are not posthumanist, and some environmental health and environmental justice movements do not concern themselves with nonhuman life, I would contend that the trans-corporeal recognition that humans are part of the flux of the material world – and not transcendent, rational, securely enclosed commanders – strikes a blow to human(ist) exceptionalism and feminist neohumanism. If all creatures dwell at the crossroads of body and place, at the intersections of the biotic and the xenobiotic, having arrived there by the vicissitudes of evolutionary millennia as well as by the more recent processes of industrialized, pharmacized, militarized, (bio)engineered global capitalism, then on what basis do (post)humans blithely dispense with the multitude of other creatures? As we witness the Sixth Great Extinction which takes place, ironically, at the same moment when millions of animals are being produced for food, product testing, science experiments, and medical testing,[5] why wouldn't the invisible spectacles of the long march of wild creatures headed to nonexistence and the endless conveyor belts of animals whose existence consists of nothing but pain and deprivation provoke a palpable compassion for fellow creatures who find themselves within inescapable networks, systems, and material interchanges? Biopolitics is a posthuman, multispecies matter. Understanding our bodies, our selves, as immersed in flows of sustenance and harm is a formidable task for all living creatures. Fish, sea birds, marine mammals and other ocean dwelling creatures, for example, who eat bits of plastic, mistaking them for food, are not unlike Ulrich Beck's citizens within risk society, who do not possess the scientific instruments or the data necessary to assess the novel dangers lurking in what would seem to be benign.

Trans-corporeal posthumanism, with its material-discursive, politically situated, embodied knowers, is indebted to a rich legacy of feminist thought and activism. Feminist thought, especially what I have termed "thinking as the stuff of the world," (see Alaimo 2016) may conduct us through the dissonant notes of the posthuman and the anthropocene. The very term "anthropocene" stresses the

[5]For more on this terrible irony, see Wolfe (2013).

enormity of human impact upon the planet, as one species has colonized the globe, affecting life across terrestrial habitats, down to the depths of the seas and up to the very atmosphere (see Alaimo 2016). As Paul Alberts puts it, "Humanity's recent activities can be measured now at a scale commensurate with the geomorphologic narrative of the planet, which extends across thousands, millions, even hundreds of millions of years" (2011, 5). Ironically, the posthuman emerges at the pinnacle of the "triumph" of the human. Whereas a critical posthumanism seeks to topple the Human as a conceptual apparatus that underwrites ordinary practices of domination, the recognition that we – all creatures – dwell in the anthropocene, demonstrates that the homo sapiens has "achieved" an astonishing feat, that of the epoch-making planetary alteration, if not domination. The recognition of transcorporeality becomes crucial at this strange moment when the world has become all too human and yet the Human itself seems an untenable, delusional, and certainly destructive concept. Timothy Morton echoes (but does not cite) material feminists when he asserts what "ecological thought must do then is unground the human by forcing it back onto the ground" (2013, 19). But he rejects the idea that "humans are embedded in a nebulous overarching system" in favor of "thinking hyperobjects" (2013, 19). Echoing the refrain that "the personal is political," without mentioning feminism, Morton explains that his "thinking style," his "intimate impressions" are no longer "'personal' in the sense that they are 'merely mine' or 'subjective only': they are footprints of hyperobjects, distorted as they always must be by the entity in which they make their mark" (2013, 5). Feminist theories of subjectivity, feminist epistemology, feminist science studies, and material feminisms are conspicuously absent from this speculation about hyperobjects, which despite the footprints, leave the human thinker intact. Feminist thought, art, and activism are replete with modes of thinking as simultaneously biological, material, political, discursively constituted subjects, with a heap of experience – good and bad – of already being "on the ground." (Recall the images of Kruger and Mendieta.)

In forging a theory of how the posthuman subject makes sense of herself as part of the material flux and uncertainty of the world, I have drawn upon science studies models of capture such as Andrew Pickering's notion of "mangling," as well as the material feminist science studies of Karen Barad. Barad's concept of "intra-action," in which entities do not precede their relations but always constitute each other, may be one of the most disconcerting yet useful concepts for developing an environmentalist praxis for the anthropocene, as it rules out the possibility for humans to think themselves as removed from a multitude of material agencies. Tracing intra-actions and other modes of entanglement between substances and systems enables political critique and the development of ethical and political modes that do not separate the human from the material world. As Hillevi Lenz Taguchi puts it, "Responsibility is thus built into the immanent relationship between all matter and all organisms." (2010, 176). The staggering scale and fearsome pace of anthropogenic alterations of our shared biophysical world will no doubt bring unknown futures. But we cannot protect ourselves from such futures

by approaching the world as a warehouse of inert things we wish to pile up for later use, as the managerial models of sustainability would suggest. Instead, "we must hold ourselves accountable to a materiality that is never merely an external, blank, or inert space but the active, emergent substance of ourselves and others" (Alaimo 2016, 178). Thinking as trans-corporeal subjects, as physically part of the anthropocene, means that we cannot take refuge in familiar, comforting narratives of human mastery over an external nature. Just as the (post)human material subject is both vulnerable to and responsible for interconnected, extensive material processes, networks and affects, every other living creature also dwells at the crossroads of body, place, and substance, in a world where neither Nature nor the Human are recognizable as such. Material feminist subjects, who think and act as the very stuff of the world, can guide us through the risky, troubling landscapes of the anthropocene.

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Chapter 5
Posthuman Phenomenologies for Planetary Bodies of Water

Astrida Neimanis

From Embodiment to Bodies of Water

Our blood, biles, humours; our lubrications and ingestions; the rivulets that make their way from our inside to out, from watery womb to watery world – we are bodies of water. As such, we are not on the one hand *embodied* (with all of the cultural and metaphysical investments of this concept) while on the other hand primarily *constituted of water* (with all of the attendant biological, chemical and physiological implications). Rather we are both of these things at once – mostly made of watery matter, as well as an expression of water as a conceptual figure. We live at the site of exponential material meaning that emerges where embodiment meets water.

Imagining or figuring our human embodiment in terms of "bodies of water" presents three challenges to a humanist understanding of embodiment, which are useful for thinking about bodies in an ecologically-oriented, feminist posthumanities perspective. In the first place, "bodies of water" trouble the idea of bodies as discrete and coherent individual subjects. As bodies of water we leak and seethe, our borders always vulnerable to rupture and renegotiation. As we know, our human bodies are at least two-thirds watery, but more importantly, these waters are in constant process of intake, transformation, and exchange. For humans, the flush of waters sustains our bodies, but also connects them to other bodies and other environments – drinking, urinating, sweating, transfusing, siphoning, sponging, weeping. Human bodies are thus very literally implicated in other animal, vegetable and planetary bodies that materially flow through us, replenish us, and draw upon our own bodies as wells. This circulation inaugurates us into complex relations of gift, theft, and debt with all other life (Neimanis 2009, 2012, 2013a).

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_5

The relationality of our bodies of water is also one of *milieu* (Chandler and Neimanis 2013). As milieu-for-another, water is gestational and directed toward the becoming of other bodies. Watery bodies are neither autonomous nor autopoietic: they require another body (that in turn required another body) to bathe them into being. Our watery bodies' challenge to individualism is thus also a challenge to phallogocentrism – one's forgetting of the bodies that gestated them, and facilitated their becoming (see Cixous and Clement 1986; Irigaray 1991). Importantly, this watery gestationality is decidedly posthuman, where human reprosexual wombs are but one expression of a more general aqueous facilitative capacity inherent in all watery life. Bodies as *bodies of water* are themselves milieus for other bodies and other lives that they will become as they relinquish their own: human bodies ingest lake bodies, lake bodies are replenished by rain bodies, rain bodies inhale ocean bodies, ocean bodies slake fish bodies, and fish bodies feed whale bodies, which eventually sink to the seafloor to be swallowed up again by the ocean's dark belly.

This brings us to the third challenge that bodies of water present to a humanist theory of embodiment: bodies of water undo the idea that bodies are necessarily or *purely* human. As already noted, the bodies from which we siphon and into which we pour ourselves are other human bodies (a kissable lover, a blood transfused stranger, a nursing infant), but just as likely a sea, a cistern, or an underground reservoir. Our watery relations in/as a more-than-human hydrocommons thus challenge an anthropocentrism that privileges embodiment as a human attribute. And, of course, these three "isms" that bodies of water challenge – discrete individualism, phallogocentrism, anthropocentrism – are all deeply entangled, and mutually invested in one another. The work of bodies of water is thus also to remind us of this still-pervasive "master model" (Plumwood 1993).

Bodies of water also offer a fourth significant challenge, of particular relevance to the environmental posthumanities: to imagine ourselves as bodies of water also intervenes in how we think about *water*. Water is not simply something "out there" – environment, resource, commodity, backdrop (Chen et al. 2013). The various ingestions and ablutions noted above remind us that we are made of water, but just as importantly, *water is made of us*. Consider, for example, the allergy medicines your might take to ease your hayfever, or the antibiotics you take to fight an infection. As porous bodies of water, we don't harbour these medications for long. Rather, they move through us to take up residence in the city sewage system, and then, because these pharmaceuticals degrade slowly, they are further dispensed into the rivers and lakes of your watershed. (A day later, another tablet is swallowed with another glass of water, decanted from that same watershed. Who's medicating whom, we might wonder). Just as water animates us, our matters animate those waters in turn, for better or worse. Not only are we watery cyborg bodies, as Donna Haraway (1985) might say; water is always cyborg, too.

Bodies of Water as Feminist Figuration

The aqueous flows and forces that we comprise are never neutral; they are directed by intensities of power and empowerment. Currents of water are also currents of queerness, coloniality, sexual difference, global capitalism, imagination, and multispecies community. Water's transits are neither necessarily benevolent, nor are they necessarily dangerous. They are rather material maps of our multivalent forms of marginality and belonging. They are an aqueous politics of location (Neimanis 2013a), a watery assemblage always in-the-making. As bodies of water, "we" are all in this together (Braidotti 2002), but "we" are not all the same, and we are not all "in this" in the same way.

Might we then consider bodies of water as a feminist figuration (Braidotti 2002, 2006, 2011; Haraway 2004; Neimanis 2013a)? Figurations are "material-semiotic knots" (Haraway 2004) or "living maps" (Braidotti 2011, 10). Figurations are also political, and can be an expression of feminist protest: a "literal expression" of those parts of us that the "phallogocentric regime" has "declared off-limits" and "does not want us become" (Braidotti 2006, 170). Moreover, figurations are not arbitrary, but acknowledge "concretely situated historical positions" (Braidotti 2006, 90) and respond to particular contemporary problems. Clearly, our planetary waters and water systems are wounded in many ways –worsening droughts and floods, aquifer depletion, groundwater contamination and salination, ocean acidification, as well as the commodification and privatization schemes that too narrowly seek to direct water's flows. The figuration of bodies of water is a direct response to these issues. Our bodies are also of carbon, air, mineral, earth, and other matters, but figuring ourselves specifically as bodies of water highlights a particular set of planetary assemblages that requires our attention right now (Neimanis 2013a).

Figuring ourselves as bodies of water is a way of taking up an ethical subjectivity toward our planet's vital waters, and toward colonized and marginalized human bodies differently affected by water crises. It is also an ontological challenge to dominant humanist readings of bodies. But figurations are not conceptual fantasies. Never merely metaphor, these imaginative interventions describe what we already are, but *amplified*. The figuration is both already there, *and* waiting to be tapped (Neimanis 2013a). This then raises the question: from where does the figure of *bodies of water* emerge? What propels it, and what kind of method facilitates its unfolding?

Phenomenological and Feminist Sources

The figuration of bodies of water surfaces from a deep attentiveness to the ways in which I am embodied, and to how this corporeality matters in/as the world. It begins by asking: how is water in and of my body? For instance, when I drink a

glass of water, where does it come from? How does it animate me, as a motile and sensory apparatus? Where does it go? To which bodies does it connect me, and to what effect? Such description begins by necessarily bracketing the understanding of "body" that I have inherited from a dominant Western metaphysical tradition – that is, as a bounded materiality and individual subjectivity, where a rational or thinking subject is considered separate from fleshy and affective existence. This description proceeds by way of curiosity about how bodies exceed the strictures of anthropocentric and phallogocentric corporeality, both conceptually and materially.

Understood in this way, unfolding bodies of water as a figuration might be appreciated as a *phenomenological* exercise – one that, taking heed of Edmund Husserl's famous dictum, goes "back to the thing itself" (Husserl 2001, 68) in order to account for things as they appear in experience. Yet, a Husserlian transcendental phenomenology – one that purports to yield "absolute essential knowledge" not only through bracketing the "natural attitude" but through bracketing *oneself* in favour of a "transcendental consciousness" (Allen-Collinson 2012) – cannot support the kind of aqueous figuration in question here. While acknowledging phenomenology as a key methodological tributary for activating bodies of water as a figuration, an ecologically-oriented feminist posthumanities demands a specific kind of phenomenology – namely, a posthuman one that both acknowledges the situatedness of all bodies of water, as well as how the difference of these bodies, and their situations, crucially matters.

Like any other field of inquiry, phenomenology has grown and fractured, with new versions of phenomenology carrying with them conceptual debts even as new theoretical commitments are forged. For French phenomenologist Maurice Merleau-Ponty (1962), going "back to the things themselves" cannot escape the body in some transcendental move; it is a necessarily embodied undertaking. Merleau-Ponty's oeuvre offers a detailed theory of embodiment, in which he discovers that the body is not something we "have," but is rather something we inescapably *are*. His keen attention to embodiment as consciousness thus provides a helpful method for corporeal attunement – useful for developing the figure of bodies of water. His ontological understanding of bodies, folded chiasmatically into the world by way of what he calls "flesh" (Merleau-Ponty 1968), moreover orients a posthuman phenomenology in ontological terms, insofar as he radically refuses any definitive separation between body and world. Rejecting dualisms in which humanist understandings of embodiment are usually mired, Merleau-Ponty's "radical revision of the body's ontological sense" (Barbaras 2004, xxiii) instead presents a body that emerges from various debts and connections to other bodies. Merleau-Ponty (2003) importantly acknowledges an intercorporeality between different kinds of bodies (human and other animal, for example), but at the same time crucially refuses an amorphous blurring of bodies into sameness – instead recognizing the provisional ways in which certain kinds of bodies intertwine with others in the creation of particular lifeworlds. This is not a recipe for solipsism, but an understanding of depth of the world as always containing multiple perspectives which no one perspective could ever exhaust (Connolly 2011, 51).

Ron Broglio refers to Merleau-Ponty's philosophy as opening up the possibility for a "post object and posthuman phenomenology" (Broglio 2011, 189); William Connolly (2011) suggests that Merleau-Ponty's rethinking of the body revises both the Western idea of the subject (now enfolded in/as the world) and our idea of Nature (as enfolded in/as human embodiment). As such, Merleau-Ponty – thinking at the cusp of posthumanism, from within a phenomenological tradition – is a key source for developing embodied posthuman figurations.

However, this is not to say that Merleau-Ponty can give us, fully formed, a theory of aqueous embodiment adequate to the figuration of bodies of water. While offering us methodological handholds for describing this embedded corporeal ontology, the overlap *and* difference of bodies in Merleau-Ponty's thought is not explicitly considered in terms of how or why bodies come to matter, or why this connection and differentiation matters in terms of living well, with other bodies in difference. Here, feminist phenomenologies – also at the vanguard of questioning what "the body" is and means – are a crucial supplement. Like phenomenology more broadly, feminist phenomenology is far from a homogenous field. While important differences mark the work of philosophers Simone de Beauvoir (1980), Luce Irigaray (1985), and Iris Marion Young (1980), each of these thinkers insists that phenomenology must be attentive to the sexual difference of bodies – thus underlining the necessity of taking embodied difference as a starting point for an embodied ethics. Feminist philosophers variously drawing on the phenomenological tradition have also been instrumental in stressing the ethical dimensions of a phenomenologically evident intercorporeality of bodies – here the work of Gail Weiss (1999), Ros Diprose (2002) and Lisa Guenther (2006) are notable. Irigaray (1991), Cixous and Clement (1986), and Margrit Shildrick (1997) have moreover offered feminist phenomenologies of bodies as leaky, permeable, and intercorporeal – teasing out the ethical responsibilities that arise as a result. Each of these feminist phenomenological developments contributes to a contemporary posthuman feminist phenomenology that explicitly considers the ethical questions that emerge between human and more-than-human ecological bodies – such as found in the work of Eva-Marie Simms (2009) and some of my own (e.g. Neimanis 2014). This chapter cannot adequately map the variations within feminist phenomenological commitments; its goal is to rather stress the importance of a feminist phenomenological genealogy for providing a rich gestational milieu for an ecologically-oriented feminist posthumanities – one where embodiment inaugurates both ontological interconnection and ethical obligations.

Toward a Posthuman Phenomenology: Lived Experience and Scientific Knowledge

While feminist phenomenologies help us articulate a phenomenology that is attentive to the ethical flows of difference, posthuman phenomenology must still surmount another problem: if bodies of water emerge through a description of

embodiment as experienced in/as the lifeworld, how can we account for the limits of human perception, and the many ways in which bodies of water seem to escape our directly sensed corporeality?

We could begin by acknowledging that the attentive description that generates the figuration of "bodies of water" is never *mere* description; it is also an imaginative amplification of what we are and could still become, in more intense ways. Here, we can consider how descriptions of bodies of water invite science into a productive assemblage of knowledge. While notable exceptions persist and proliferate, existential phenomenologists have traditionally been critical of the scientific-empiricist view. Natural scientific explanations of bodies do not – at face value, anyways – appear to be particularly congruent with attention to *life as it is experienced*. Merleau-Ponty himself asserts that the reliance on phenomenological description over analysis and explanation is "from the start a foreswearing of science" (1962, viii), even as he engages scientific stories as useful starting points or complements to his own investigations. Commonplace understanding of the two discourses might hold that phenomenology is the study of something from the inside, while science is the study of something from the outside – and that phenomenological and scientific approaches are ultimately incompatible. Posthuman understandings of bodies, however, can be understood to embrace scientific knowledge; on a posthuman view, bodies operate on different interpermeating registers, from the biological or chemical to the technological, social, political and ethical. Bodies – like bodies of water – live both above and below the level of the human individual as classically conceived in liberal humanism in ways that question the boundedness, autonomy and coherence of that subject.

In short: if some phenomenologists are sceptical of relying on science to describe lived experience, posthumanism might be sceptical of relying on human lived experience to generate anything other than a reinstatement of normative, humanist and anthropocentric worldview as "truth." In a more specific and very practical sense, it is not immediately clear how the tools of an embodied phenomenological analysis would be helpful for attentively describing experiences that are below or beyond human-scaled perception, but to which natural scientific inquiry gives us access. How do we experience and describe the workings of our intracelluar bodily fluids, or of the pleural waters that coat our eyeballs? How do we hone our attention to the dissipation of our perspiration into a humid forest atmosphere, or the journey of our SSRI-laced urine into estuarine communities downstream? How do we phenomenologize the effects of such flows on bodies to which we seemingly have no experiential access? In other words, can we still rely on a journey "back to the things themselves" to make sense of these posthuman ways of being embodied? How might we enact a posthuman phenomenology *in practice?*

A posthuman phenomenology begins by affirming that a scientific and phenomenological view are not necessarily incompatible. As Ulrich Beck notes, many of our contemporary embodied experiences "require [...] the 'sensory organs' of science – theories, experiments, measuring instruments – in order to become visible or interpretable" (cited in Alaimo 2010, 19). Stacy Alaimo, drawing on Beck's work, suggests that "syncretic assemblages" of knowledge are needed to

understand the ways in which our bodily matter is implicated in a world that cannot be adequately grasped through one mode of inquiry alone (2010, 19). Even if Alaimo suggests that "trans-corporeality" (that is, the transit of matter between and across more-than-human bodies) is "*not* a phenomenological […] stance" (2009, 23), perhaps this surmisal instates too wide a gap between the attunement of phenomenologists and that of natural scientists to the wonder of the world. In other words, scientific knowledge and phenomenology can be one of these syncretic assemblages.

For aren't the experiences "below and beyond" the individual humanist scale – a gurgling gut, a sweaty dispersal into the fog, even the effect of our ablutions on riparian life – also strata of our lived experience? If some scientific findings – such as those of evolutionary biology, organic chemistry or molecular physics – may seem too abstract, imperceptible or distant for verification through lived embodied experience, this might just be a case of the hegemony of a human-centred and human-scaled perception. To assume bacterial life, meteorology, or multispecies biochemistries are not *lived* in some way in and through the sensory apparatuses of our own human bodies either underestimates the actualities and potentialities of our embodied dispersals, or misunderstands what it means to live. Interestingly, despite Merleau-Ponty's distrust of the hegemony of scientific perspectives, he also states that "all my knowledge of the world, even my scientific knowledge, is gained from my own particular point of view, or from some experience of the world without which the symbols of science would be meaningless" (1962, viii). This is an opening to posthuman phenomenology. Relationships and processes that govern the world we inhabit, and which are described by various scientific discourses, are all in some way lived—directly or intensively, virtually, and imaginatively – by us (Neimanis 2007, 2013b). This is hardly to say that we control the world, or are its centre; it is rather to affirm our inalienable connection to the more-than-human world. Bodies of water as figuration remind us that our bodies are composed of – and affect – generations and geographies that vastly exceed our own human-scaled subjectivity. This is not an instalment of mastery; it is a call for responsivity, and responsibility.

The overlaying of biological, chemical, or other scientific paradigms onto more human-scaled experiences not only reconfigures our understanding of "embodiment" and "the lived," but also makes available to us resources that can help us access, amplify and describe our posthuman corporeality. Because scientific accounts either stretch or shrink our human proximal relation to certain matter or forces, by grappling with such accounts we can nudge ourselves closer to appreciating those dimensions of experiencing the world that do not easily conform to a human-centred one, but which we nonetheless live, skimming across, journeying through, gathering up and nestling inside our own lived embodiment. Indeed, scientific perspectives on the mechanics of fluids, the chemical composition of water, the ecological hydrological cycle and the necessity of water for the gestation of all life can facilitate contact with my posthuman corporeality.

For example, while the fleshy buoyancy that cushions my bones has little need for words like *intracellular fluid (ICF)* and *extracellular fluid (ECF)* to experience

the watery buffer zones that facilitate every movement my body makes, scientific description can nonetheless help me understand the workings of my motile body's water as I bend to lift a book or bump my hip into a chair. Or, stretching my proximal grip on my body of water even further, evolutionary biological description can help me tap into something as distant as my becoming-primordial and the experience of my transcorporeal relations with other-than-human species. According to scientific accounts, I have inherited a "mammalian diving reflex" that allows me to dive to depths much greater than most animals, thanks to a marked reduction in heart rate and cardiac output that reduces my body's consumption of oxygen (Morgan 1982, 77). While my body certainly "lives" this science, and is the source of these observations, my experience of this reflex is enhanced through evolutionary accounts that allow me to extend through space and time and to connect to bodies seemingly quite distant to my own. My affinities with my marine mammalian ancestors are amplified, and when I dive now, I *live* this relation in the ways my own body moves or feels.

In other words, science can act as what I call a "proxy story." Acknowledging that our embodiment is always conditioned by stories and knowledges that extend beyond immediate embodied experience *in situ*, proxy stories can be avenues for de-sedimenting our human-scaled perspective on embodiment. Science stories do not substitute for embodied engagement but serve as *amplifiers* and *sensitizers*. This is not a failure of phenomenology to get "back to the things themselves." Scientific explanation of a mammalian diving reflex, for example, does not invent the sensory experiences of my body in a transition from land to deep water – these are embodied knowledges too. Such stories, however, help me to tap into these connections, and expand my corporeal imaginary in key ways. The phenomenon is already there, swimming in my waters and burrowed in my flesh. These reciprocal but always imperfect dialectics between scientific knowledge and more directly available lived experiences, are the tools of phenomenological attunement.

At the same time, feminist views recognize that biological and other scientific forms of knowledge have an inauspicious history of reifying or essentializing aspects of women's embodiment to oppressive ends. Too quick an alliance with the "truth" of science can have disastrous effects, not only epistemologically but also practically, for women, people of colour, indigenous peoples, queer people, people living with disabilities, as well as myriad non-human others. Yet, while feminist views are rightly concerned with the false objectivity of positivist empiricism, feminist engagements with (and practice of!) science can help mitigate risks inherent in the syncretic assemblages of posthuman phenomenology (Neimanis 2013b). As Elizabeth A. Wilson writes (resonating with the claims of many others), unless we enter into serious conversations with science, "feminism is closing itself off from a vibrant source of political agency and energy" (2008, 390). Even as we are wary of scientific postivism's dangers, innovative and liberatory understandings of embodiment will not come from ignoring scientific knowledge. A feminist integration of phenomenology and science can be both cautious and enthusiastic, both critical and creative.

Phenomenology keeps us alive to the "wonder in the face of the world" (Merleau-Ponty 1962, xiii). When such "wonder" meets the serious acknowledgement of those corporeal experiences "below and beyond" a humanist view of embodiment – such as amplified in the proxy stories of science – this can shift the experience of our own humanness. The edges of our discretely bounded selves begin to blur, and our skin becomes increasingly porous. In other words, while phenomenology may not *require* this amplification, syncretic assemblages with science contribute to a posthuman frame of understanding that can enhance, rather than annul, phenomenology's insights. Implicitly, then, this attunement always connects experience to imagination. How we imagine the world to be is strongly connected to how we will experience it; we require deliberate efforts to dislodge or loosen sedimented imaginaries, and open space for new ones. This creative stretching results in a reconfigured corporeal imaginary that is operationalized through figurations such as bodies of water. What puddles in/as me? Where do I flow? What levees, dams, or sluices direct and/or block these watery connections? How do these imaginative currents reveal the very *real* implications of my embodiment in water stresses, contaminations, or other kinds of natural resourcings?

Human Ties, Posthuman Situatedness

Importantly, a posthuman phenomenology does not dispense with the human – this is neither possible nor desirable. When we discern figurations such as the body of water using a posthuman phenomenological method, these insights are still undoubtedly articulated by my human self. But does that make this figuration, or this method, irredeemably humanist? This, in part, is the question that any purportedly posthuman methodology must face. At the end of the day, research and theorizing by humans is a human endeavour – it is a human enterprise that seeks to make meaning out of our common existence – whether the "we" invoked here is a limited human(ist) we, or a more expansive and inclusive more-than-human one. In other words, a posthuman method cannot have the goal of annihilating the human subject (Deleuze and Guattari 1987); this is just a transhumanist fantasy in a different guise (Åsberg 2013). A posthuman methodology (of scholarship, maybe also of living) is rather an inevitably human project that engages meaningful collaboration with the more-than-human world, broadly understood. More specifically, a posthuman phenomenological method asks the phenomenologist to activate and amplify the more-than-human modes of living *that are also always part of existence and part of our "own" corporeality*. Our human modes of living – as water teaches us – flow into the more-than-human world in myriad ways. At the same time, there is no escaping the (specifically-situated) human.

And, if (on the flip-side) phenomenologists are troubled by the use of proxies and syncretic assemblages such as science as ways of getting to "experience" or going "back to the things themselves," it bears remembering, as Donna Haraway taught us many decades ago, that all vision is prosthetic. We only know the world through the mediation of prosthetics – there is no "pre-mediated" state to get back

to (Haraway 1988). Both a tongue and a water quality autosampler, both a sensitive fingertip and a DNA sequencer, are sensory apparatuses that help us know the world – and as Karen Barad (2007) teaches us, in knowing we are also *worlding*. All such apparatuses forge the world as we know it; all are fallible, all are variable, and none is total. Any experience of the body-as-lived is never simply "given." In this sense, no less than the specific powers of our primate retinas and optic nerves determine what we are sure we "simply" perceive (Haraway 1988), so too do microscopes and telescopes world certain visions while they hold others at bay. *This holds for all sensory apparatuses*. Language, cosmology, ideology, and corporeal imaginaries equally serve as prostheses that open certain experiences for us, but foreclose or restrain others. All of this only underlines what Merleau-Pontian corporeal phenomenology and feminist posthumanism have already stressed: our embodiment and becoming-with other bodies evidences an inescapable co-constitution of nature and culture, of imagination and matter. All existence is cyborg; any "thing" we "get back to" is accessed only through situated embodiment.

In short, a posthuman phenomenological method exerts a two-way pressure: first, upon phenomenology to understand that all perception comes from somewhere and is conditioned by various prostheses. Getting "back to the things themselves" will always require something like Haraway's situated knowledge. But secondly, a posthuman phenomenology also reminds posthumanists that the embeddedness of bodies within contexts, within specific possibilities and matrices of power, cannot be transcended. A posthuman method can no more easily escape the situatedness of the practitioner than a phenomenological one can. Flight from one's specifically situated human body is not feminist posthumanism, but rather an arrogant fantasy (Åsberg 2013). And here we find ourselves again finding support from a host of feminist commitments: in addition to situated knowledges (Haraway 1988), other feminist contributions such as politics of location (Rich 1986), feminist assemblages of power (Puar 2012), queer phenomenology (Ahmed 2006), among others, all *condition* the kind of posthuman phenomenology I am advocating. The problem is not description but rather the assumption that description is grounded in or attached to a certain kind of body – coded white, straight, male, able-bodied, and human. A feminist posthuman phenomenological method must insist on describing the (social, morphological, cultural, biological, structural, imaginative) conditions that enable certain experiences for some bodies, but foreclose others for other ones. Not only do we require the syncretic assemblages of science to find our posthuman phenomenological bearings; we also need to equally attune ourselves critically to the differences of bodies that together world our planetary hydrocommons. The kind of posthuman phenomenology I am advocating must be committed to feminist, but also anti-colonial, anti-racist, queer and crip futures.

Finally, if a key aim of feminist posthumanities is also to intervene in current states of affairs, and to experiment in modes of worlding *otherwise*, then the question remains: what do these posthuman phenomenological descriptions do? What can they change, and how can they illuminate and produce more ethical accounts

of living well together? Posthuman phenomenology can be a vital tool at the intersection of environmental humanities and feminist posthumanities, where thinking with environmental matters, such as water, transform the contours and limits of humanistic modes of inquiry, but also of its ethics. Refiguring ourselves as bodies of water is not only an experiment in human embodiment; it is also a feminist commitment to following the flows of marginalization and injustice, as well as those of connection, empowerment and joy, that our watery corporealities collaboratively engender.

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Chapter 6
Couch Grass: Ethics of the Rhizome

Barbara Bolt

> Ethics is about mattering, about taking account of the entangled materializations of which we are part, including new configurations, new subjectivities, new possibilities – even the smallest cuts matter (Barad 2007, 384).

This essay takes the artist Bianca Hester's invitation to engage with the exhibition, *please leave these windows open overnight to enable the fans to draw in cool air during the early hours of the morning*, as an opportunity to investigate an ethical call, a call that makes a demand *and* requires a response from those who accept this invitation. Through addressing the dynamics produced by and through this invitation, the essay asks what is expected of a participant in order that they may "leave the windows open" and enable new configurations and relationalities to emerge. It directs our questioning to how we might prepare ourselves to be open to such a challenge and sets out to sketch a "user's guide" to attune us to this task. By adopting principles of carefulness, indebtedness and co-responsibility, the essay proposes that art-life may be reconfigured as an ethical encounter, one that draws on ethical know-how to enable art and life to proceed relationally and differentially.

In orientating ourselves to this "invitation" the first question to ask could be: To whom is this invitation addressed? what is the obligation required from the addressee to allow the fan to draw in the cool morning air? and finally, who is capable of taking on this (ethical) obligation? In *Minimal Ethics for the Anthropocene* (2014), Joanna Zylinska argues ethics is a mode of locatedness and that "humans alone engage in the historical practice of reflecting on such forms of relationality with others, via philosophy, story-telling and art" (2014, 97). For her, these practices carry with them an ethical obligation and a responsibility, which necessarily make a demand on humans and asks for a response (2014, 95). Art, understood this way, says Zylinska is ethical. It is "world-making rather than

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_6

just representational" (2014, 105). How then does *please leave these windows open overnight to enable the fans to draw in cool air during the early hours of the morning* make its ethical call and what may we learn about a (post)human ethics from this call? (Fig. 1) What might a (post)humanist ethics look like?

Please leave these windows open overnight to enable the fans to draw in cool air during the early hours of the morning opened at the Australian Centre for Contemporary Art (ACCA) in Melbourne in 2010. The online advertising for the exhibition, described this as a "major new work by Bianca Hester (which) will see this influential Melbourne-based conceptual artist use ACCA's main gallery as a sculptural prop – and a venue for her experimental, spatial playfulness".[1] Even though Hester defined the parameters that set this "exhibition" on its way into becoming it would be inaccurate, in (post)human terms, to describe this "new work" as Hester's work alone. While she marked out the main gallery as an arena for action, Hester then invited a colourful cast of disparate characters – human and non-human, fabricated and organic, built and found, monumental and diminutive, lightweight and the heavy – to assemble differently and differentially in the gallery space to engage with her in this spatial play.

In the lead up to the exhibition opening, a series of bricklayers worked with grey brick Besser blocks and mortar to construct a brick-wall-divider towards the far end of the gallery and to lay a low (but unfastened) brick wall which skirted the periphery of the gallery, providing a place to sit, prop objects and lie around.

Fig. 1 Bianca Hester, detail of *please leave these windows open overnight to enable the fans to draw in cool air during the early hours of the morning* 2010, media and dimensions variable. Collection of the artist.
Photo: Ian Curtis

[1]See https://www.accaonline.org.au/exhibition/bianca-hester-please-leave-these-windows-open-overnight-enable-fans-draw-cool-air-during. Accessed 30 November 2015.

A bobcat and bobcat-driver drew in 10 cubic metres of "clean fill" dirt appropriated from construction sites across Melbourne and set it down to meet with the cement gallery floor; clumps of concrete jostled with chains and wooden structures, while a lump of sandstone, originally from rural Horsham (and on loan from a landscape supplier in Bulleen) settled itself into a deep blue mat. A blue hoop and a continuous blue line of building tape ran together along the wall, setting up and making relations with the many and various blue objects and elements in the space. In the meantime, Hester sent off a series of emails to her human networks to invite them to enter into the fold of the work. This invitation contained a proviso: If they engaged with/in the project they should *leave the windows open overnight to enable the fans to draw in cool air during the early hours of the morning* (Fig. 2). By the time the exhibition was "officially opened" we were already well into the middle of things—events, connections and the most unlikely of relations.

At first glance this "set up" – the relation of the raw matter that made up the pile of dirt and mudstone, the Besser blocks and formed wall appear to gesture towards understanding (and questioning?) art as form-matter synthesis; the transformation of matter into form. Alternatively, the play of blue across the space – the running blue line, blue hoop, blue mat, blue props and metal lengths and bits and pieces – seem to suggest a formal relation between visual and spatial elements; a formalism of sorts. However, in a tiny gesture – a pink A4 sized poster positioned on the right hand wall at the entry of the gallery stating ACTIONS WILL OCCUR INTERMITTENTLY – Hester signals that neither a formal nor a form-matter synthesis will suffice. This "score" or "script" sets up the organizational logic for the exhibition.

Fig. 2 Bianca Hester, detail of *please leave these windows open overnight to enable the fans to draw in cool air during the early hours of the morning* 2010, media and dimensions variable. Collection of the artist. Photo: Ian Curtis

So let us turn to Hester's small poster and examine the lively set of connections and relations it suggests. Andrew Benjamin's catalogue essay for *please leave these windows open overnight to enable…* proposes that to "evoke a script is to set in motion complex modes of relationality" (2010, 1). Through the provocation of the small poster, the space transformed from a space for contemplation into a space for/of action. As Philippa Murray observed, it was becoming a performing (the) space:

> Even dormant, the objects that Hester arranged gave a sense of actions-that-could-be; the basketball, hoop and bicycle were easily imagined into action ... audiences were free to activate the objects as they desired … These actions performed the interior: basketball was played over the brickwall, a horse perambulated across the space, a car was driven in, a man lay under the golden satin sheet. Each time the space changed accordingly … (2012)

Here, there is potential for anything to come into relation with anything else – connections were made and unmade; new heterogeneous relations between the human and nonhuman participants create particular intensive moments and then dissipate as different elements begin to flock and agglomerate. For a brief moment, in a photographic cut from the flux of the exhibition, the urine stream of the horse connects virtually with the hoop to spin it into action becoming a hula-of-a-horse (Fig. 3), while in another space-time the hoop leaves its place propped against the wall and connects with the blue metal beam creating a visual force that sends the beam virtually pivoting on its fulcrum. In this

Fig. 3 Bianca Hester, detail of *please leave these windows open overnight to enable the fans to draw in cool air during the early hours of the morning* 2010, media and dimensions variable. Collection of the artist.
Photo: Bianca Hester

"imagining" of the assemblage the figure human form provides a prop for the form – human-becoming-prop (Fig. 4).[2]

Openness, heterogeneity, connectivity, relationality and multiplicity are explicitly embraced in *please leave these windows open overnight to enable*…. This view of the art-assemblage, positions art-as-rhizomic. Here, it could be argued the figure of the rhizomatic art-assemblage comes to supplant the form-matter synthesis or, what Hester has termed, the hylomorphic model that governs common understandings of art and the artist (2014, 8). Yet, despite the seductiveness of the Deleuze and Guattari's rhizomic productivity, that is inherent in the organisational logic of this exhibition, there persists a niggling concern that the figure of the rhizome may not prepare humans adequately for the task of enabling an *ethos* to allow new configurations and relationalities to emerge in such a worlding.

Felicity Colman tells us that Deleuzian rhizomatic thinking "functions as an open-ended productive configuration, where random association and connections propel, sidetrack and abstract relations between components" (2005, 232). According to Colman, Deleuze and Guattari aim to offer an "open system of thought" in the way their work activates and reconfigures relational energies and brings into conjunction disparate forms and knowledge. Similarly, Hester aims to enable an open matrix – a project-in-motion, which she hopes will "introduce a liveliness (which will) emphasize, activate and embrace change-fullness as the work's conditioning

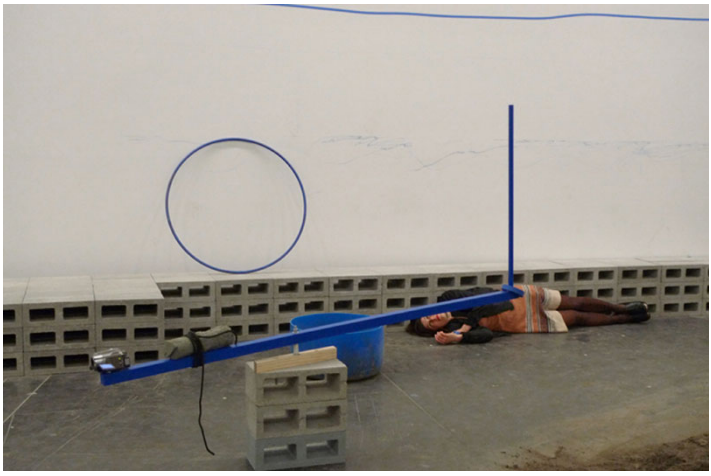

Fig. 4 Bianca Hester, detail of *please leave these windows open overnight to enable the fans to draw in cool air during the early hours of the morning* 2010, media and dimensions variable. Collection of the artist.
Photo: Bianca Hester

[2]This assemblage resonates with Donna Haraway's notion of the material-semiotic actor, a conception that attends to the relations and forces that take place within the very process or tissue of making (1991, 210).

subject and event" (2013, 8). To do this, she asks that her human interlocutors "*leave these windows open overnight to enable the fans to draw in cool air during the early hours of the morning*." This is an ethical move for Hester, one that concurs with Zylinska's "minimal ethics" which, drawing from Emmanuel Levinas, suggests that there is a "sense of ethical obligation and responsibility… that makes a demand on the human and that demands a response from him/her" (2014, 95).

Instead of imposing form on matter, Hester envisages the gallery space as a place where one must "follow the flows of matter" (2013, 8). Here she follows Deleuze and Guattari who observe that, "matter is in movement … and … flow can only be followed" rather than mastered (1987, 409). To follow the matter is, according to Deleuze and Guattari to itinerate and to ambulate rather than master or create some form out of matter.

Hester specifically rejects the hylomorphic understanding of artistic production, where matter is conceived of as mute or "lumpen stuff," which is to be formed by/through the will of the artist (2013, 15).[3] For Hester, the work of this sculptural assemblage involves creating an openness that will enable "the unintended and accidental actualizations" of connections and conjunctions between the human and the non-human, the fabricated and the organic and the built and the found. The residues of these activities, for example, "the skid marks on the floor…," "the blue scuff marks… on the wall" and "the residues of mud and manure" from the horse's actions became for Hester, "a kind of score for future action" (2013 8).

This directs us towards an alternative understanding of the relation between matter, of art and the artist. Art, as Deleuze and Guattari tell us, "is not an image of the world", but instead forms a rhizome with the lively open forms of the world (1987, 11). In this heterogeneous reconfiguration, as we have seen, connections can and will be made with any point to create multiplicities – hula-of-a-horse and human-becoming-prop. As different connections are made and unmade, so the nature of the multiplicity will change. Here the artist-as-rhizome is no longer the *causa efficiens* of art, and "the rhizome is not reducible either to the One or to the multiple" (Deleuze and Guattari 1987, 7).

Hester comments:

> What happened within the arena – while partly being planned – mostly occurred due to the work's informality, generating a range of responses from the publics who engaged it. This field was largely ungoverned – or if not entirely ungoverned then up for ongoing negotiation, inviting a process that was not guided by any absolute code or protocol set forth in advance. The ever-changing context that emerged meant that objects, materials, invigilators, viewers, curators, participants and myself – were enveloped in a situation in constant flux (and in which moments of conflict developed). This is so because the project was structured in such a way that an opening was activated for the unexpected to occur (2013, 7).

In this statement there is a faith that *something* rather than nothing will happen and that this something will be productive rather than pure chaos. In *What is*

[3]In her rethinking of art in a posthuman context, Patricia McCormack notes that, "The onus is neither on the artwork nor the mythologized intent of the artist, but the subject's witness's coming forward or path taken" (2012, 45).

Philosophy, Deleuze and Guattari state clearly that what is not composed is not a work of art. They propose that art's role is to confront chaos, throw a net over it and create a plane of composition (1994, 191). For them, it is only through summoning forth the "invisible forces of gravity, heaviness, rotation, the vortex, explosion, expansion, germination and time" that art makes "perceptible the imperceptible forces that populate the world" (1994, 181–182). These forces, they argue, are not just glimpsed, but actually affect our becoming (Bolt 2010).

However, the question remains: How is the artist able to summon forth and make perceptible those invisible forces? Hester is committed to the task of allowing matter's implicit liveliness to become perceptible through being open to what ever is. Through imploring her visitors to "*please leave these windows open…*" Hester alludes to the politics inherent in the project. However, in order to be able to embrace what Hester has positioned as matter's "indeterminate condition" (2013, 4) and attend to its compelling openness, the artist-as-enabler requires some form of ethical know-how to assist in this task. For Hester, openness requires, what Elizabeth Grosz has termed, "a politics of acts" (2002, 470). This begs the question: Against what principle might/can/does the artist engage the multiplicity? What strategies might an artist engage to enable this?

In her essay, "*Ethos* of Diffraction: New Paradigms for a (Post)humanist Ethics", Kathrin Thiele argues we need to "develop a thought-practice in which concepts are not abstraction from the world, but an active force *of* this world" (2014, 203). Through this, she affirms our thought-practices are "always/already implicated in and concerned with world(ing): practicing (sic) and envisioning specific practices for this world" (2014, 203). She proposes that "it matters how agencies are envisioned – subjective and non-subjective ones – for the diffracted/-ive naturecultures and the ethico-onto-epistemological one-ness as multi-pli-city that now has emerged as world(ing)" (2014, 208).

Hester agrees that it is at the level of thought-practices that this must be addressed. She identifies a critical attitude or attuning that is required by the practice:

> I am not suggesting that the work was an endlessly open situation in which anything could take place in a "free for all". I remained intensely present to and in the work, attending to it regularly, performing, observing, responding and negotiating throughout the exhibition…. Like the case in St Jerome's study discussed by Jan Verwoert, the only thing to do was to leave the door ajar and then deal with whatever entered, no matter what (2013, 8–9).

Her reference to St Jerome is critical for our discussion in thinking through questions of a politics of acts. Hester draws on Jan Verwoert's essay "Personal Support: How to Care," (2009) to gesture to the *ethos* that underpin the organisational logic of *please leave the windows open overnight to enable the fans to draw in cool air during the early hours of the morning*. Verwoert's essay addresses Niccolo Antonio Colantonio and Lorenzo Monaco's fifteenth century painting, which depicts St Jerome extracting a thorn from the paw of a lion. Whilst most accounts of this story focus on St Jerome's gesture in removing the thorn, Verwoert has focused on the fact that St Jerome left the door of his study open

and "dealt with what came in", as the central lesson to be considered (Verwoert 2009, 172). Hester draws on this parable to identify an attitude towards making that introduces a notion of care and responsiveness. She says:

> Leaving a door open provokes a commitment to being responsive no matter what happens to enter and no matter how different or unsettling this may be to the plans that we fashion in advance. In committing to responding, what is affirmed is the willingness to both encounter and grapple with what enters, even if uncertain or radically unprepared (Hester 2014).

It would be fair to say that one could not make art without an attitude of openness and responsiveness. However, in Hester's thinking there is an important difference of degree that asks us to think differently about two rather stubborn and persistent ideas about art and the artist. In the lexicon of art, "the artist" continues to persist as the One who brings art into being. We only need to return to the framing of the exhibition to see how this operates. The gallery website announces the exhibition in the following way: "A major new work *by* Bianca Hester will see this influential Melbourne-based conceptual artist *use* ACCA's main gallery *as a sculptural prop* – and a venue for *her* experimental, spatial playfulness."[4] In this announcement, the gallery and the objects in it become framed as props for the artist's "experimental and spatial playfulness." Embedded in the text, is a logic of instrumentalism where the world becomes a resource for us as human beings to use in whatever way we wish. In this case it is with "experimental spatial playfulness." This is not the sense that Hester carries with her when she takes on Deleuze and Guattarian invocation to follow the flows of matter. For Hester, "following rather than forming" (2013, 5) undoes the form-matter synthesis or the hylomorphic model that underpins our common understanding of what art is. Further it repositions the role that the artist plays in the creation of art.

How then can we begin to translate or map the shifts that Hester is hoping to enable through *please leave the windows open overnight to enable the fans to draw in cool air during the early hours of the morning*. The use of the term "prop" in this context needs examination. A prop is a support or a stay. Used in the context of the discourse around the exhibition, it the gallery that provides the sculptural prop. Yet, in the exhibitions title, there is a sense of reversal. There is an entreaty (both here and in the email inviting participation by her colleagues, friends and networks) to the human participants to "leave the window open" to "enable the fans to draw in cool air." There is an imperative for the human participants to be responsiveness to what *is*, what Hester sees as "a capacity to be affected by an outside" (2013, 11).[5] If anything, the human functions as the prop, since they are required to attend to matter's eventfulness, be responsive to it, and lend a hand in order to summon forth and "make perceptible the imperceptible

[4]See https://www.accaonline.org.au/exhibition/bianca-hester-please-leave-these-windows-open-overnight-enable-fans-draw-cool-air-during (my emphasis).

[5]Hester is referring to Nick Bingham's (2006) notion of "nonhuman friendship" as a "capacity to learn to be affected by an out-side."

forces" that populate the world. The openness to what-*is*, is central to Verwoert's strategy on how to care.

This takes us a step closer to understanding what ethical-know may be required for a politics of acts. Two pieces in the puzzle may be identified so far. Earlier in this essay, I identified Hester's stated renunciation of the hylomorphic model of art – one that sees art in terms of the form-matter synthesis. In her thinking, matter (*hyle*) is dynamic, eventful and noisy and this requires the artist to be open and responsive to this dynamism – to follow the flows rather than corral matter into some form that is the intent of the artist. Secondly, while matter may go in its own way willy nilly – flow, clump, pool, harden, vibrate and quiver, rotate, explode, expand or germinate – the artist's attentiveness involves a political and an ethical positioning. Hester's larger project sees the artist as having particular responsibilities in/for the art assemblage. She expects this of Bianca-Hester-artist and, in her appeal to the human participants in the project, she also expected it of them. Whether or not they heeded the call, is another matter. If one sees the world instrumentally, it would be very easy to come into the gallery space and just use things as one always does. Hester hopes that in the intensity that is *please leave the windows open overnight to enable…*, there just may be a glimmer of another way of being-with-others – human or the more-than-human.

However, before we proceed further we must address a conception that has insinuated its way into this discussion shifting us away from instrumentalist understandings of the world. Earlier in the essay, I posited the organizational logic of *please leave these windows open overnight to enable…* as rhizomic. While Deleuze and Guattari's notion of the rhizome may provide us with the pragmatics, the apparatus and the toolbox to become rhizomatic, they do not necessarily provide strategies to help us mere humans negotiate a politics of acts, as is suggested by Barad, Grosz, Thiele, Verwoert, Zylinska and Hester.[6]

In the context of the postmodernist critique of modernist principles of mastery, artistic genius, originality and self-expression, artists across and between different practices have taken up the generative and productive principle of the rhizome with alacrity. In its wake the modernist notion of the avant-garde, with its relentless and restless quest to break boundaries in the creation of the new became embattled and has transmogrified and re-emerged different and differentially as "avant-garde pluralities." In *The Ghosts of the Avant-garde(s): exorcising experimental theatre and performance*, for example, James Harding proposes the avant-garde

[6]Thiele sees a congruence between the model of ontology and ethics, which appears in Karen Barad and the Deleuzian inspired formula "ontology – ethics" in the figure of "becoming." She argues that in Deleuze's conception of "becoming" the two domains – ontology and ethics – "touch up/on each other" in such a way that "both sides become-different from what either 'ontology' or 'ethics' in a classical sense were meant to be" (2014, 207). However, Thiele is also concerned that thought-practices "are always/already implicated in and concerned with world (ing)," commenting that an affirmative politics of difference involves "a thought-practice in which concepts are not abstraction from the world, but an active force of this world" (2014, 203). This begs the question of how the politics of difference are played out in and through the Deleuzian figure of the rhizome.

as a rhizomic principle. In this reconfiguration, says Jennifer Buckley, avant-garde movements are figured as "internally pluralistic, always moving in multiple directions from multiple points of origin … (they) coalesce, develop, and disperse" rhizomically (Buckley 2013).

But what does this mean for the problem at hand? Anne Sauvagnargues suggests that for Deleuze and Guattari, art is located "beyond the morality of good and evil, and emerges from an ethics, or an ethology, of force relations" (2013, 41). But how does it do this? Deleuze and Guattari may tell us that the rhizome includes both the best and the worst (citing the potato and couch grass), and propose that the distinction between good and bad provides the basis for real ethical difference. And, they agree that the artist *must* create the syntactical or plastic methods and engage the necessary materials to activate the "power of a ground that can dissolve forms and impose the existence of a zone in which we no longer know which is animal and which is human" (1994, 173–174). However, this imperative does not bring with it practical strategies for how the artist may develop the ethical know-how to engage a politics of acts as such. For Deleuze and Guattari, the rhizome is production of production; a principle that makes connections and allows life to proliferate.

This is all well and good, but on a very practical note, I still rue the day I planted couch grass runners in my garden. The couch grass has taken over, insinuating its way into every corner of the garden, overwhelming every thing in its way. It is invasive, aggressive and indiscriminating. Put simply couch grass has no ethical accountability: It does not care what gets in its way and doesn't have "the capacity to learn to be affected by an out-side." What then does this actual material encounter with couch grass reveal about the metaphorics of the rhizome? What can we draw on to guide every day life, art and our practices and how might we learn to care?

In order to address this question, I wish to return to Verwoert's plea for an openness to what-*is*. This brings us into the realm of Martin Heidegger's anti-representationalism and his call for humans to rethink their relation to the world. This is a very different space-time from Deleuze's ethics, which, as John Marks points out, offers a "creative commitment to maximizing connections, and of maximising the power that will expand the possibilities of life" (Marks 2005, 83). However, it does address the question of what a mere human might do to lend-a-hand in order to maximize such a possibility. In his lecture "The age of the world picture" (1977), Heidegger returns to the ancient Greek conception of what-*is* as presence. Here, the human:

> is the one who is… gathered towards presencing, by that which opens itself… in order to fulfil his essence, Greek man must gather *(legein)* and save *(sozein)*, catch up and preserve, what opens itself in its openness, and he must remain exposed *(aletheuein)* to all its sundering confusion (1977, 131).

Unlike Deleuze and Guattari, whose philosophy anticipates the post-human condition, Heidegger's phenomenological approach is grounded in a humanist tradition. Yet, despite this, or perhaps because of this, he sees that in the company of what-*is*, humans are neither privileged nor detached. They merely exist among other

things. What makes human beings unique, says Heidegger, is that humans alone ask the question: What is Being? And, in their role as the "guardians of being" humans have particular responsibilities to other beings in the world. They are, for example, required to be open, to lend-a-hand to enable "the coming to presence or presencing of technology" (Heidegger 1977, 37). Thus, in place of an instrumental understanding of technology or more broadly the world, Heidegger asks us to reconfigure our relations in terms of care (*sorge*).[7] Where things are conceived and used as a means-to-an-end and a resource for use by humans, he proposes a relationship of co-responsibility and indebtedness.

This refiguring of the relationality of what-*is*, is played out through Heidegger's example of the creation of a silver chalice. This refiguration of createdness provides a way to reshape our understanding of relationality in the artist-art constellation. He sets it out very simply and clearly:

> Silver is that out of which the silver chalice is made. As this matter (*hyle*), it is co-responsible for the chalice. The chalice is indebted to, that is, owes thanks to, the silver out of which it consists. But the sacrificial vessel is indebted not only to the silver. As a chalice, that which is indebted to the silver appears in the aspect of a chalice and not in that of a brooch or a ring. Thus the sacrificial vessel is at the same time indebted to the aspect (*eidos*) or idea of chaliceness. Both the silver into which the aspect is admitted as chalice and the aspect in which the silver appears are in their respective ways co-responsible for the sacrificial vessel…. But there remains yet a third that is above all responsible for the sacrificial vessel. It is that which in advance confines the chalice within the realm of consecration and bestowal. Through this the chalice is circumscribed as sacrificial vessel. Circumscribing gives bounds to the thing…. Finally there is a fourth participant in the responsibility for the finished sacrificial vessel's lying before us ready for use, i.e., the silversmith (1977, 7–8).

Here, artist's responsibility does not derive from her/his role as *causa efficiens*, or because in working s/he brings about the finished object. Heidegger contends that the silversmith is co-responsible for bringing the silver chalice forth into appearance (Heidegger 1977, 8). Heidegger teases out a different relation between the silversmith, the silver and the chalice. As matter is co-responsible for the chalice, so the chalice is indebted to the silver (Heidegger 1977, 7). Further, a silver chalice wouldn't be a chalice without the idea of chaliceness nor would it be a sacrificial vessel without the circumscribing bounds of the religious ritual of communion. In Heidegger's thinking, these ways of being responsible are also indebted to the efforts of the "silversmith for the 'that' and the 'how' of their coming into appearance and into play" (Heidegger 1977, 8). Thus in this mutual interdependency the silversmith is co-responsible with and indebted to matter, aspect and circumscribing bounds for the bringing into appearance of the silver chalice.[8]

[7]This essay draws on the analysis of Heiddegger's understanding of createdness in two earlier publications: *Art Beyond Representation: The Performative Power of the Image* (2004) and *Heidegger Reframed: Interpreting Key Thinkers for the Arts* (2011).

[8]See an extended discussion of this refiguration of createdness in the chapter "The artist in a post-human world?" (Bolt 2011).

The importance of Heidegger's refiguration of createdness becomes immediately apparent in thinking through the processes engaged in by contemporary artists such as Hester. In the relation of care, responsibility and indebtedness that characterizes production, the artist or craftsperson is no longer the sole creator or master of the work of art. Rather, the artist is co-responsible for bringing "art" forward into appearance. Argued from this perspective, artistic practice necessarily involves a particular responsiveness to, or conjunction with, other contributing elements that make up the particular art-ensemble. It signals a different way of thinking the precise state of the interminglings between humans and technology.

Heidegger's view of humans as guardians of Being and his call to humans to "lend-a-hand" can be seen to be incompatible and in contradiction with a Deleuzian framework that offers the rhizome as an apparatus of becoming. However, in his thinking that both human and non-human elements – materials, ideas and purpose – are co-responsible for the emergence of art, he decentres the place of "the artist" and offers us a way out of both a subjectivist view of the artist as genius and our instrumentalist use of things in the world. The re-distribution of power posited by Heidegger's reconceptualization of createdness is one that can be seen to offer us a way to think about the operations of a politics of action not just in the realm of art but in the realm of life and liveliness.

This brings me to a final consideration. Through the complex relations one develops in working with the art-assemblage, the artist gains ethical know-how which enables them to enact a politics of action. For Francisco Varela (1999), a politics and ethics of practice is inextricably linked to a specific tissue of circumstances or situatedness. This links us to Donna Haraway's notion of situated knowledge as an ethical form of embodied knowledge that is locatable and able to be called into account (Haraway, 1988). To act ethically, one must be acting with sensitivity to the particularities of the situation, and here there can be no reliance on a set of rules. This kind of know-how, argues Pia Ednie Brown, is grounded in the kinds of tacit knowledge that emerge through practice (2012). She continues, "ethical know-how becomes a 'measured' practice of engaging with the world, of how we behave, of what we acknowledge is at stake. Rather than being framed around the virtuous, ethico-aesthetic know-how is about the virtuoso: the skilled performer" (2012). Thus, skill *with*, rather than mastery *over*, becomes the ground for a politics of action in art. We have to be willing to take the risk to be open. We also need to have the capacity to learn the skills that allow us to be open to be affected by an-other.

Finally, then we can return to *please leave the windows open overnight to enable…* and to Hester's "encountering and adventuring." What does her commitment to being "being responsive, no matter what happens to enter" (2013, 7) imply for creative practice? She says:

> …if we allow ourselves to be provoked by matter's implicit eventfulness then we may be compelled to incorporate a radical fluidity in our practices … what I'm sketching out here is a kind of practice that is trained upon motility, in response to the provocations compelled by and in response to the motility which conditions matter (2013, 4).

At the outset of this essay, I set forth the question: What might a (post)humanist ethics look like?, asking what practical know-how and practical politics may orientate us to the task of living ethically in a (post)human world. Through an examination of the exhibition *please leave the windows open overnight to enable the fans to draw in cool air during the early hours of the morning*, I have argued, following Thiele, that our a thought-practices are active force *of* this world that enable new configurations and relationalities in worlding. The capacity to be open and responsive to what-*is* is critical in this endeavour.

We could, after Timothy Morton, call this capacity a "radical openness to everything" (2010, 15). However, as Zylinska has pointed out, while "openness may position us as always already involved, obligated, entangled," "openness in itself does not guarantee the taking up of the ethical challenge" (2014, 95). Thus in order to be able to be open to what-*is*, human beings require the ethical know-how to know how to precipitate a politics of action. We may draw on this ethical know-how to proceed relationally and differentially and begin to talk of "skill with" rather than "mastery over" the world. This could relate to a "minimal ethics" that Zylinska talks about, one that acknowledges the responsibility that human beings have in relation to worlding the world, but also acknowledges the lively conversation through which art-life emerges. According to such an interpretation, the reversioning of createdness as one of care, indebtedness and co-responsibility could be seen to anticipate a mode of relationality that has at its core a politics of action. This politics of action may enable us to move beyond the metaphorics of Deleuze and Guattari's rhizome to becoming attentive the relations implicit in *n*-1. This may constitute a (post)human *ethos*.

Acknowledgements I would like to thank Bianca Hester for her generosity in the preparation of this essay. I very much appreciated her responsiveness and critical engagement with the text and for permission to reproduces the images.

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Chapter 7
Algorithmic Tumult and the Brilliance of Chelsea Manning

Matthew Fuller

The term posthuman is sometimes used to denote a supercession of the human by means of multiple kinds of enhancement: with the brain and sensual organs becoming part of a service core providing key emotional, reflexive and phenomenological glue to a more advanced cognitive, immunological and performance-enhanced superstructure. Sleek persons with complex electromagnetic auras perform labour, proceduralise compensatory erotic behaviours, and divine important subatomic truths with a glance of their analytically enhanced irises. In the future they will have gone through so many upgrades that not even their souls have an end-user license agreement to neutrally click "okay" on every time they awake to feel their veins squirted with artisan meta-smoothie.

Frankly, that this is not the kind of posthuman discussed here in this chapter is a bit of a let down. The perfect future of heightened productivity and emails that are largely attended to by an enhanced sub-processing unit of neural tissue in the lower intestine has got a lot going for it. In this version of the posthuman, much of what is in the vapoury prospectus, alongside the buckets of vitamin pills and fantasy exoskeletons that we have to put up with while we wait for it to arrive, has to do with computing (see Kurzweil 2005).

Nevertheless, computation is also a key factor in the shift to the posthumanities. Computation marks and makes a fundamental reorganisation of communication, calculation, power. One way of reckoning this is to suggest that the humanities emerge in the technical era of print, the long period when humans wrote and read more alphanumeric characters than machines now do. The humanities emerge with the culture of writing, and are generalised as a condition with the advent of print. One of the boundary conditions of access to the condition of humanity, a conceptual event also arising with the early phases of colonialism but not

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_7

reducible to it, was that of performing the functions of reading and writing, even if only to be able to install the moral operating system of the church. This is why there is so much value in contrapuntally irruptive narratives such as Solomon Northup's memoir *Twelve Years a Slave* (2014) and Harriet Beecher Stowe's novel *Uncle Tom's Cabin* (1999), where the formalisations of the human are contested in the accounts of slavery seeping out from those trained to keep their lips tight. Accounts of violations of the human by those who claim to own and determine are here executed in alliance with medial forms. And, why, as has been noted by scholars such as Elizabeth Einstein (1979) and Jonathan Israel (2001), there has historically been so much activity around the censorship and corralling of print; after all, books are disturbing things.

But print has been supplemented by other means of circulating text. If, as Virginia Woolf suggests of the figure of London in the novel *The Waves*, "the streets are laced together with telegraph wires" (2004, 43), what are we to make of the metropolis when instead of the loopily hung copper laces of telecommunications, cities are now much more intimately corseted or stitched up with software? What kind of cosmopolis, an agglomeration of spaces for the carrying out of life, is brought together when a botnet, hiding out as human user on social network systems, uses a method of randomly generated hashes of 140 characters in length to send messages via microblogs (such as Twitter or Weibo) to set instructions for another botnet to whose function is as yet unknown. As a paper by a group of computer scientists from Chengdu and Beijing recently notes in discussing such botnet systems, networks have no inherent need for any "master" or central command. The proposed mobile botnet using a peer-to-peer topology has no centralized command and control infrastructure. Instead, command messages are injected into the botnet via any bot using micro-blogging services. These commands are signed as botmaster, which tells the bot to automatically propagate the microblog message to other bots (see Li et al. 2013).[1] The effects of such networks are non-linear, an algorithmic tumult with results exceeding the set of simple instructions that combine to put them into effect. Such inventive uses of computational and networked digital media, and indeed far more mundane ones, with all their idiosyncrasies and insufficiencies of execution create a condition in which we must speak of software as cultural and political, not simply in a way that figures it as a tool or as a utility with ideological and other exigent tendencies, but as something now fundamental to and transformative of all forms of life with which it comes into composition with or instantiates. This condition also invites the revaluation of all forms of communication in relation to the predominance of a generalised one of malware: decision support systems; powerpoint; mind-maps; spreadsheets; workflow software; schedulers; apps that simply broker relations between two flows of information that they bring together in order to shave micro-imbalances in transaction value.[2] The mode by which such systems operate is that

[1]For a comparator anatomy of a large-scale botnet, see Stone-Gross et al. (2011).

[2]See, for a further discussion of such an argument, Fuller and Goffey (2012).

of empowerment, but they are also malware to the extent that they are software developed to enhance, by coordination and entrainment, a computing resource which may or may not include an appended human user.

The difficulty in articulating this condition is partially because of the relatively recondite and diverse nature of the technical knowledge that is seemingly required to do so. A recent blog post by a programmer notes, "Not a single living person knows how everything in your five-year-old MacBook actually works" (Welch 2014). This is one of the posthuman characteristics, the complexity of machines and sciences surpasses the capacity to know the detail of all the components of such an everyday object, let alone to be abreast of all the arts and sciences as might at least be aspired to or gestured at, if not quite ever actually attained, in the early days of Renaissance humanism. Computational empowerment therefore is always caught up in relation to forces that are not explicitly or fully comprehensible, and as malware, is also always entangled with the exercise of power on processes of empowerment. Such forms of power are, in turn, excessive of simple knowledge to map and reconcile them.

In the few decades since Alan Turing's formulation of the abstract machine underlying the computer, computational structures, processes and forms of materiality have voluminously expanded. Turing's move was to abstract the operations of a person carrying out a calculation by remembering and enacting an algorithm or an "effective procedure" into a procedure at a higher level of description.[3] A result of this is that all operations that can be translated into symbolic terms, or that can be transduced into or be rendered more or less handleable by such things have the tendency to become, or to be made, in one way or another, computational. These transitions are intensely generative at a number of levels. Firstly this was something found in the mode and consistency of the transition itself; in the tweaks, speed-ups and ablations that they incur in social, cultural, political and economic terms (see Fazi and Fuller in press). The sheer volume and speed of calculations made by early computers is what made them then notable.[4] Secondly, there are significant effects in the way in which such symbolically-rendered operations are brought into a generality of computational forms, theorised in the early years of the "personal computer" as a metamedium that importantly did not only include variations on priorly existing media but also simulation; and more recent novel means of generating computational modes of existence that extend substantially beyond the frame of the computer (see Kay and Goldberg 2003). Thirdly, that in this generality, computational forms are now also the means of arranging forms of governance that move from micro to macro scales, from the interpersonal to the international, from the molecular – as in pollution sensors, to the molar, as in the vast internet monitoring and analysis mechanisms of PRISM, Tempora and

[3]Turing's aim was to find the limits of calculability. Jacob Gaboury's (2013) series of posts on *Rhizome* tracing, "A Queer History of Computing" are useful here.

[4]See, for instance, Italo Calvino's account of a visit to Wall Street and to IBM in 1959–1960, marveling at the scale and rate of calculation (2003).

others; but that also take other forms that are not simply about amplifying centralized control.[5] Fourthly, that in this condition the operations of capitalisms (as competing and intermeshing systems of general equivalence to money) increasingly work by means of symbols without necessary external referent, become both intensely computational and leak into an also increasingly computational culture. Fifthly, and perhaps most demanding of analysis, such conditions, subtended as they are by the universality of the Turing machine, involve the generalization of a condition of great, potential if not actual, social, technical, intellectual and economic malleability.

It is this malleability formed in the great pullulating, constraining, mobilizing and administrating admixture of parts that constitutes a fundamental radicality of the long present. But it is also because computing shows the abstract nature and malleability of logics of governance that it also offers something else, a fundamental challenge to contemporary modes of organisation. This capacity of malleability is why computational systems have to be disciplined and entrained. This power of malleability is why the moment of algorithmic tumult is also disruptive and fascinating to established authorities. In relation to the question of the posthuman, the abstract "universal" machines of computing; the systems of general equivalence of forms of capitalism; meet the emerging discourse on and material potentialities and difficulties of the reconfigurability of the species that set up an intensive matrix out of which probabilities are extracted and futures induced.

Such a condition deserves something of a consideration, and one that works by means other than a mere "debunking." Indeed, the recent movements of the squares, of Occupy, the Indignados and others, seem to indicate that a quasi-computational imaginary of procedurality that reworks such social malleability is pervasively yearned for. The partial inhabitation of platforms for mass computing such as Facebook comes at the cost of the computing of the mass. Equally, alongside their links to the loose alliances of movements such as Anonymous, movements also became tiny gestation points of modes of explicit software creation that, more or less successfully against the tides of the moment, attempt to elicit the forms of politics they call into being. At the same time, such movements attempt to render procedurality humane, slow it down, make the process recognisable, and in doing so to gain momentary consensus. Other parallel currents, such as those around piracy and cryptography meld forms of critical computing with the way in which computational systems are both highly malleable, yet also, under the interlocking effects of social, cultural and economic forms, considerably immutable.

One can say that numerous forms of geek libido, invention and effervescence arrange themselves around and through such things forming processes of subjectivation that meshes and merges with non-linear effects of processes acting on processes

[5]These systems follow on from a long history of surveillance agreements between what can be seen as an "anti-commonwealth" of white-dominated nations: the USA, New Zealand, Australia, UK, Canada, the "Five Eyes Network" developing into Echelon, and the more recent systematisations, such as those exposed by Edward Snowden, aiming at turning the internet into a global honeytrap.

acting on data accumulated though algorithmic interaction on itself (see Parisi 2013). The position of invention and of malleability is of course also multivalent, inducing modes of subjectivation that follow the perversity of such malleability and its iterative filiation with modes of blockage, repression, filtering, class, caste, gender and racial ordering, as they couple also with technical limitations and the limitations of the imaginary as they filter through into and channel technical manifestation.

And there is in turn an allure to occupying the space of the Master of Signifiers, the operator of all codes: those of persons, capital, computing; those that have yet to emerge; that are not yet decipherable and that are to be drawn into being (see Goriunova 2013). It is this kind of position that is in a sense reversed and enrolled by an enthusiasm for the madnesses and habituations of participation, of following and ordering, of finding, submitting to or entering a new code, clicking through to release. Procedural crazes are new kinds of behaviours that emerge in the context of selfies, memes, neknominate. But they can also be seen in the development of aggressive and sexist rather than paradoxical forms of trolling, procedural crazes of obedience to patriarchal norms (see Sampson 2012). Each of these in turn brings on further instances of the execution of preformatted speech in the consideration or condemnation of these forms. There is a pleasure to be found in the locking into of systems, feeling them ripple as a tendency into ones being that is perhaps also undergone, in their own terms, as a prehension by formalisations themselves.

As Tiziana Terranova (2014) has it in her reading of Tarde, entities within networks can be figured as Leibnizian monads affirming their expansion. As such, they are also to be found in the operations of High Frequency Trading, and the shifting deposition matrices of drones. One of the characteristics of such a position is that it also forms part of the consistency of globalization, where a tendential universality of procedural operations is also inflected and modulated, blocked and amplified by myriad local and larger scale conditions. These monads thrive by war-dialling realities to see what unlocks access to imagined further levels of control, excitement, understanding.[6] They are war-dialling in the sense that code after code is tried on the basis of what looks like a highly constrained randomness, but yet is itself filtered by and obedient to a set of norms and pro-forma reality-forming schema that pre-tend to the development of such systems.

In such a condition the trails and convulsions of such monads manifest as patterns of information, logs, recordings, leaks, tabulations, and copy upon copy. Their larger scale movement agglomerates to produce patterns of blobs of data, smears of information, large-scale weather fronts of documents moving across networks, and rivulets of uncanny circulation occasionally turning into floods – as things that were supposed to be kept inside an organisation, a database, a state, a corporation, a hard-drive, suddenly find themselves on the outside. In such conditions, the politics of the cloud, metaphorised as fluffy, white and affirmative, needs to be rethought in relation to other kinds of cycle. Just as the publishing and music

[6]War-dialling is a "brute-force" technique for cracking entry-codes that produces and tries large numbers of candidate codes in a short period of time.

industries have found themselves threatened and reconstituted by the widespread capacity to copy and to circulate 'their' data, so too does the state.

Any attempt to map the specific qualities of this condition, will inevitably encounter the now legally ascertained name of the person who is surely the exemplary feminist posthuman hero of the early years of the new millennium, Chelsea Manning. Not only did Manning play the crucial part in revealing numerous crimes and cover-ups by USA and NATO forces in Afghanistan, for which she was tortured and given a harsh period of imprisonment (see Mendez 2012); now, inside the innermost punishment regime of the army, the army which she was accused of betraying, and whose petty and procedural revenges she must suffer from every day, in such a condition Chelsea Manning not only persists, but insists at such a time on her nature as a trans* woman.[7]

Amidst the debate about the open rather than repressed incorporation of gays and lesbians and trans* people into the military is always the circulation of the tokens of doubt, that such persons are susceptible to unreliability, that they don't quite work as citizens, soldiers or subjects. That is, that they follow a mode of disciplinarisation that puts them at odds with the reliable machining of other forms of cannon fodder. A primary aspect of this accounting is that the soldier is transformed by the disciplinary institution of the military into something less than human, but also superlatively better. In making the sacrifice, or accepting the fate of the loss of individual will, reflexivity, the capacity of doubt and critical thought characteristic of the humanist project, they enter through a door marked rectitude and glory into an outer annex of the sovereignty of the state. Part of the transmission to a state of sacredness is in turn the at least implied willingness to act as a vector of death.

The experimental variation in the subject position of the combatant is one that is at times hurriedly rushed out to subsume the whole of the field of the state as populations are at least rhetorically enrolled in alertness, states of anxiety, concessions to surveillance. In parallel, intensified by the strategic measures of the War on Terror, were other changes in the status of the human conditioned and varied by other forms of experimental work on the subject. The movement between humanist, posthumanist and other conditions is also supplemented by voids and recesses in which the calculus of relation to humanity itself becomes a mechanism of invention of forms of subjugation. In the free for all rush to appear to get results, operatives of the governments most eager to bring their force to bear upon the world in this moment engaged in a revival of torture practices designed specifically to operate on, the legal boundary of the humanitarian. The CIA engaged in, "Waterboarding, which produces a sensation of drowning, stress positions, sleep deprivation for up to 11 days at a time, confinement in a cramped box, slaps and slamming detainees into walls. The CIA held detainees in secret 'black site' prisons overseas and abducted others who it turned over to foreign governments for

[7]Manning's statement uses the term trans* in order to, "denote not only transgender men and women, but also those who identify outside of a gender binary." See Chelsea Manning Support Network (2014).

interrogation." (Watkins et al. 2014). More accurately then, we can say that the aim was to break that boundary whilst providing a new seemingly humane narrative for its transgression.

The debate on posthumanism thus intensifies at a point in which the condition of the broadly western liberal democratic project which claims a historical affiliation with humanism, becomes subject to other kinds of actual, imagined and threatened leakage and betrayal from within. Such betrayals are carried out both by those engaged in "terror," and those from the core factions of the state, itself under conditions of deliquescence and hardening, who rush to claim that they save their populations from the panoply of terrifying unknowns. The project of humanism, extending from the renaissance, is not of course something reducible to the requirements of organisations such as NATO, IMF and the OECD, but we can say that humanism speaks in a voice that is too often also ventriloquized by such entities. Its conceptual leakage therefore requires some evaluation.

Emerging at a proximately similar time, access to the position of the human which is extended, on paper at least, to a whole panoply of prior outcasts becomes tenable at a time when it is also something capable of being suspended rather than to be spoken of in terms of a fundamental "right"; enabling those rights in turn to become multifarious points of leverage on and means to curse those the west finds as its temporary opponents or allies. This is not to speak of a simple hypocrisy in which a deviation from a prior or ostensible truth is to be revealed, but a condition in which the civilisations seeing themselves as the proponents and guardians of the values that found their gestation in humanism, make themselves definitively "post-." Here the imperative of a generalised managerialism of "hard but unfortunately necessary" decisions and violations demands obedience to its reformatting of economies, learning and the life-patterns of work and reproduction, adding its own special qualities to the repertoire of a beleaguered posthumanity. In such a condition, whilst pop music celebrating human freedom plays through the cages of Guantanamo Bay, it is infinitely laudable to find a lone figure energetically miming to tracks by Lady Gaga whilst copying thousands of database entries that would be later uploaded to the servers of Wikileaks.

These databases gave an event-by-event chronicle of the unfolding situation for the USA and NATO forces stationed in Afghanistan and Iraq. Manning made these public as a historical document whose effective power lay not in providing informational succour to enemies, for whom the information was already old news, but in setting up the means for a properly informed public debate on the nature and purpose of these wars. Aside from these databases, Manning made public a sample of internal State Department communiqués; video-footage of Reuters journalists and others, including children, being killed and gloated over by US military; and a number of other documents, some of which have yet to come to light, but reputedly including video footage from the Garani Massacre.[8] At the

[8]See *Statement in Support of Providence Inquiry – US vs Private First Class (PFC) Bradley E. Manning (U)* (2013).

very least these leaks provided the means to revisit the question of whether any kind of public with the means to analyse such material exists, and if there is any adequate means for effective debate in the societies concerned. The hollow laughter that often customarily follows such an enquiry also gives rise to other forms of attachment. Rather than attend to politics, why not put effort into something positively describable as functional? Notable in the discourse around Manning, and geeks more broadly, is the way in which there is the implicit formulation of a kind of care work for data and for systems, one that connects to the geek libido, but figures it around system administration and intelligence analysis rather than the discourse of gender. Care for data is subtended by the discourse of security, trusted systems, data hygiene, but also by the use of initiative and long hours at the machine, of thoughtfulness and concern in the exercise of skill (see Coleman 2013). Turning away from the wider intractability of problems in the world to the development of self and the care for data and for systems has created a key, but not the sole, modality in which the implicit ethical discourse of geeks is carried out. Proceduralities here may become political not by slowing them down, but by working their intensifications in relation to other kinds of flow. Monadic drives become trickles, leaks, potential cloudbursts.

Amidst such tumult posthumanity indeed, hurts. Amongst posthumanity's differentiation from the subject of humanism is its extension and complication of the domain and modality of tragedy. One of the ways it has done so is by modifying the conditions of disjuncture between the massiveness and omnipresence of computational and social systems and the action of individual persons, in which however certain specific actions may occasionally have significant consequences depending on the conjunctures in which they might find themselves or that might be created. Such actions may include the copying of a file, the writing of a line of code, circulating an image. In this, the figure of the whistle-blower, such as Chelsea Manning or Edward Snowden, and those that assist them, such as the activists and developers of Wikileaks, Cryptome, Tor and other systems that attempt to generate conditions in which such actions may gain effect is especially compelling. Equally, they remind us of what might need to be re-invented as a primary social relation for the present: disobedience. This disobedience is complemented, amplified and conditioned by the computational conditions in which it occurs, in turn giving rise to a renewed appreciation that machines too are not always obedient.

Acknowledgements Thanks to Nikita Mazurov and Luciana Parisi for their help.

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Chapter 8
Embodying the Posthuman Subject: Digital Humanities and Permeable Material Practice

Lissa Holloway-Attaway

Since the introduction of digital technologies within traditional humanities education, a reconfiguration of both academic disciplines (that is the so-called *posthumanities*) and the subjectivities that such institutional bodies include as contexts for analysis (that is the so-called *posthuman subject*) are clearly in process (Wolfe 2010; Burdick et al. 2012; Gold 2012; Hayles 2012; Braidotti 2013). Such radical transformations provide a generative basis for a feminist genealogical analysis and critique. Under the pressures of a posthumanities imperative – strongly invested in sustaining interdisciplinary, collaborative, participatory, and permeable creative and hermeneutic models – new important epistemological perspectives are emerging to reshape core values and re-inscribe the boundaries of the human. The disruptive knowledge communities of the new (digital) academy and their attendant revolutionary critical practices actively engage and promote convergent, hybrid and ontologically complex techno-human subjects. Such hybridity, explored fully, for example, in *Digital_humanities* by Burdick et al. (2012) and by Hayles in *How we think: digital media and contemporary technogenesis* (2012), reveals how transformative and emerging disciplines can work together to re-think the role of the human in Humanities. The organic-technical beings at the center (and found at the margins and in-between subjectivities) within this new Digital Humanities can combine with other intra-disciplinary perspectives and offer models to investigate materiality, embodiment, affect and performativity in ways that challenge human exceptionalism across a range of dimensions (Smelik and Lykke 2008; Coole and Frost 2010; Parikka 2011; Bogost 2012; Grusin 2015). In this overview of the digital posthumanities, I offer a context for understanding how feminist interventions in the field are connected to understanding and revealing the new material practices that traverse the boundaries between humans, technical agents, and others.

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_8

In an age where smart phones, tablets, social media, GPS and locative applications, for example, entice users to digitize their intimate selves, to track, trace, publicize their activities, share their locations, and "like", touch, stroke, finger their media and devices while doing so, we find ourselves in a particularly rich cultural context. YouTube encourages users to bypass traditional publication outlets and subjects and asks them (with their slogan) instead to "broadcast yourself," highlighting personal experiences as the overt subject and object of the media. Other social media platforms, such as Facebook, combine anthropomorphic metaphors (*face*book) with multimodal models to con/fuse genres and communication channels: one can write a text status update, post an image, geo-locate one's physical presence, and tag others with a keyboard click, to align and share communal states of being and synesthetic forms of self-expression. One can overlook spatial/temporal/social distances and re-connect with old friends, new strangers, and draw them into communion. Simply posting a grade-school picture on "Throwback Thursday," for example (a social media tradition that encourages users on Thursdays to post images from their past on platforms like Twitter and Facebook), epitomizes the complex personal, social, and semiotic markers in circulation and set into play via new digital networks. Selecting "throwback" images, uploading them, tagging old friends/family in the photos and geo-locating the setting of the images on a digital map, affirms the co-existence of convergent past/present relations and mixes spatial-temporal boundaries. Furthermore, encouraging others to "like" and "share" these nostalgic communal mediations demands a nuanced assembly of theories to recognize the embodied cultural productions and representations circulating within the digital networks of exchange.

Critical reflections about how texts and contexts are reworked as the digital tools we use to create, read, publish, interrogate, and culturally assimilate them across a variety of intersectional networked dimensions are clearly a topic requiring revolutionary interdisciplinary approaches (Bartscherer and Coover 2011; Burdick et al. 2012; Gold 2012; Hayles 2012). To grapple with complex media-bodies as they transition, for example from analogue books, to e-books, to face-books, or from diaries and log entries to blogs and vlogs, demands a wide-ranging knowledge of media types, technologies, and social contexts for use and development. And although the pervasive use of social media by everyday users is an essential component of emerging practices demanding new critical inquiry, professional research practices more bounded by the academy are also in transition. Thomas Bartscherer in his Introduction to *Switching codes* (Bartscherer and Coover 2011) recognizes, for example, that the challenge of amassing and publishing data through electronic intervention has shifted the scale and scope, as well as the type of information encountered, so significantly that we are no longer certain who, or what, should intervene in the research process to compile outputs and offer reflections. Who is skilled enough, *properly* trained, to do so: "How will the [digital] information be organized, filtered, and made meaningful? What will count as authority and how will authority be established?" (2011, paragraph 9). This interdisciplinary restructuring has greatly impacted my own personal academic journey as I have worked to find my home subject and site of critical inquiry in

the field of what we may term here *the posthumanities*. I have moved from a graduate school English Department studying literary texts, to professional and teaching experience in Culture and Media Studies Departments. Currently I am in a Department of Informatics where media forms are necessarily expansive and comparative (from books, to films, to computer games) and where literary and aesthetic content, under the influence of an emerging Digital Humanities perspective, has become *information*. Seen as information, unbounded from an allegiance to either material, human or technical bodies, or from discrete disciplinary research practices, the potential fields of study and practice are open and powerfully indeterminate. This is particularly true for feminist models that develop and engage intersectional critical models to reveal new material cultural production (Barad 2011; Alaimo and Hekman 2008; Smelik and Lykke 2008; Kirby 2011).

Prior to the deep influence of digital technologies and practices working to restructure the humanities, an enduring perspective focused on seeing technology from a *tool*-oriented perspective, that is in service to the human subject (Unsworth 2002). Such service, where humans *used* computers to support their needs, was exemplified by the term that pre-dated Digital Humanities, that is Humanities Computing. The significance of the name shift (in the early 2000s) and concurrent conversations within the academy about where to place Digital Humanities (in which department, English or Computing or elsewhere) reflect a perspective that acknowledges egalitarian relationships and more complex shared knowledge exchanges between humans and machines (Kirschenbaum 2010). However, the earlier Humanities Computing, or tool-based model, focused on promoting technology's value based on its ability to reproduce and (re-)present texts to/for humans through digital intervention, for example, by maintaining new knowledge systems, such as databases, and offering new research practices via markup practices to assist in archiving and maintenance. This early Digital Humanities work, such as the work of Father Bursa on digital concordances, primarily focused on creating systems for text processing, specialized linguistic analysis, developing digital annotation and augmentation processes, and creating indexes (Hockey 2004). However, although these Digital Humanists worked to reveal new information through novel methods of technology-assisted inquiry, they did not fully work to undo or reshape our fundamental understanding of material text production and distribution, or to reform the privileging of human (over technical) agency in cultural knowledge-making. Currently, with the work of scholars like Hayles (2012) and Gold (2012), more interdisciplinary Digital Humanities methods (including Comparative Media and Culture Studies approaches) are evident, and they are deeply informed by investigations into the changing role and function of the *user* of technologies and media and the human/social contexts for use. In Hayles' *How we think: digital media and contemporary technogenesis* (2012), she alerts us to this epistemological shift (in the title alone). Hayles explicitly claims that in Digital Humanities "we think, through, with, and alongside media" (2012, 1). From the perspective of the technogenesis framework she offers, "that humans and technics have co-evolved together" (2012, 10), we can disregard models of human privilege over static raw technical matter. Instead we recognize

that fundamental assumptions about literacy, temporalities, spatial and cognitive registers are currently in play and open for critical interventions. For Hayles, in the 21st century, we already think differently with and through technological mediation. This is not only because we have a new media-assisted perspective from which to see, but also because *we* (that is the Cartesian liberal subject *we*) are being mutually, recursively remade in our encounters within our contemporary ubiquitous media technoculture. Our thinking and being, our digitization and our humanness are mutually productive and intertwined. Furthermore, we are multisensory in our access to knowing. We may see from new perspectives (via machine-reading, or distant reading practices, for example), but we may also feel the dislocation of time and space via the experiences of machine processing systems that engage our understanding of the physical world in new ways and reorient our agencies, redistributing them for *other* encounters with cultural and material objects.

The radical reconfiguration of subject areas and examination of the attendant skill-sets necessary for academic practitioners driven by new data and media forms is evident in the work of much contemporary Digital Humanities research beyond Hayles' work (Bartscherer and Coover 2011; Burdick et al. 2012; Gold 2012). In general as a developing field, the *new* Digital Humanities (Postdigital Humanities?) offers a rich and generative model to consider technical/organic boundaries and bodies and the permeable materials that comprise them (machines, users, methods, worlds) including their renegotiation in professional academic contexts, as well as in everyday use, by so-called amateurs. All manner of users and a multiplicity of contexts are called into play within contemporary Digital Humanities research, and the nature and impact of the transformations are currently under critical debate and subject to much speculation as the critical methods and sites for investigation are renegotiated. Additionally, these new perspectives offer support for feminist reconsideration of the human body in relation to technology and digital modes of expression as they argue, in the manner of Hayles, for permeable digital/human borders and expanded knowledge fields and sites of study. Foster claims in his essay "How Computation Changes Research," included in the edited anthology *Switching codes* (2011), that "advanced computation has already had a profound impact on the conceptualization and analysis of problems across a broad spectrum of intellectual activity" and that a "common theme underlying these advances is an increased focus on understanding entire systems rather than individual components" (2011, paragraph 1). Due to the development of technologies that will allow large-scale automated analysis of data output, Foster asserts there will be a "profound change in every aspect of the research process" (2011, paragraph 3). And though this means an interdisciplinary impact for both the output of raw materials and those needed who can study them, it also means something deeper: "namely by changing how humans communicate, work, and play" computation changes "what it means to be human" (2011, paragraph 4). This is rooted in an understanding that computation is deeply embedded in contemporary media culture, and thus the discrete separation of digital and human agency is impossible. But it also signals a shift in agency and authority in

information management: who or what is qualified to analyze, access and produce the masses of data made manifest by current technology? The Sloan Digital Sky Survey, cited by Foster, uses automated digital photography (no human agent needed) to record and produce in the course of just a few years a record of a hundred million stars (10 terabytes of data) and then upload it to the Internet where anyone, amateur and/or professional, can access it, thereby crowd-sourcing the knowledge of the deep materials of the "known" universe. Currently over a million users have accessed the data and a thousand publications have been generated since it was made available. Important questions for consideration in a project such as this exemplify the paradigm shifts for researchers who must "keep up" with the information produced at the new scales and sites of production: How do we account for the sheer volume of data, and how shall it be stored and preserved? Who, or what, can gate-keep the quality of published research, and where will it reside? What is the source of this universe-knowing, and who or what do we credit with the findings (human, machine, amateur, professional)? What instruments are necessary to detect, display, reveal and represent the complex material, spatial and temporal aspects of this research, and who shall be qualified to interpret it? Undoubtedly, such inquiry, based on a deep disruption of the fundamentals of human epistemological reasoning, creates new potentialities for engaging radical posthuman subjects/objects of study, even when the universe, as such, is not at stake.

Extending this imperative for human disruption in my own critical/creative research practices, I work toward an understanding of the user as s/he is engaged by performative narrative experiences, beyond textual or desktop encounters. Currently these are digital methods that integrate and support affective response and engage emergent human-computing feedback loops on the fly. These include experiences with users in Augmented Reality (AR) experiences, with interactive mixed media installations, Virtual Reality (VR) and 3D gaming environments, but also on Social Media platforms like Facebook and Twitter where real and virtual lives and friendships are forged via technical mediation. These emergent technologies and the networks they support offer intriguing potentials for interdisciplinary research as a way of uncovering the dynamic potentialities of knowing and being with slippery and permeable alliances. As I work to formulate passageways between and among traditional literary and humanities communities (where I was trained) and comparative media, digital culture studies, and information technology contexts (where my research is positioned professionally) I am particularly struck by the possibilities to extend into more overt feminist explorations of bodies, subjects, and new materialities. I am hyper-aware that the processive reconfiguring of the disciplines that embody me, so driven by technological influences, also re-position the subjects, materials, and critical practices that I engage and hold them open for intervention. My interest, for example, in digital culture and media stems from the increasing development and growing complexity of our current media culture, where ubiquitous and mixed experiences are ever-present. Bodies, human and otherwise, are entangled in a number of ways, and they impact the way that we narrate experiences beyond human control. These new digital

bodies are then outside of the dominant paradigms (of gendered power and human exceptionalism) that traditionally configure them. Building on the earlier feminist work of scholars like Elizabeth Grosz who imagined bodies as mobile and volatile, as "excessive redundant and superfluous" (1994, viii), and outside inscriptions that cast them only in terms of binarized dualisms, I wonder how we can imagine the new corporealities of the digital domain. What does it mean to express corporeality in a mixed media world? How might one develop and design expressive and performative storytelling or narrative practices of otherness for hybrid media environments? How might we develop interdisciplinary critical methods for exploring the boundaries of virtual and physical spaces, particularly as the human body is re-positioned as part of the techno-cultural interface? I believe such research might include practical and theoretical investigations of the boundaries between organic/human bodies and technically mediated sites, between physical and virtual spaces and the performative material practices, "texts" and discourses circulating among them.

The co-extensiveness and recursive co-materialities of print/digital media (recognized in the 1990s with the development and growing influence of Internet culture and personal computing), have been a subject of study for many influential scholars who have documented the rise of the posthumanities and radical interdisciplinary forms of literary expression and new models for inscription (Hayles 1999, 2002; Bolter 2001). Hayles in *How we became Posthuman* (1999) offers a powerful critique of the post-enlightenment human subject through the perceived disembodiment of information in media culture, and she works to reconsider embodied and embedded material information structures. In *Writing machines* (2002), Hayles illustrates a range of material forces that operate recursively between digital and print text-bodies, resisting singular human control. Her work forms a basis for re-envisioning production practices and offering alternate posthuman inscription practices. Jay D. Bolter in his early work on new writing spaces in the so-called "late age of print" and later in Augmented Reality contexts and digital art installations (as with Diane Gromala in their work *Windows and Mirrors* and with Blair McIntyre in their work as co-directors at the Augmented Environments Lab at Georgia Tech) has extensively explored user/reader/participant integrations with the new interfaces of desktop experiences and beyond (Bolter 1993, 2001; Bolter and Gromala 2003). So, although Digital Humanities in its earliest manifestations was primarily focused on engaging computers within linguistic text analysis or within developing computer-based methods for archiving and text preservation, the influence of the Internet and critics like Bolter helped to extend its focus to other considerations of material meaning production. The study of hypertext forms (the linked documents which formed the basis of web pages) and expressive (rather than service-oriented) computer media became a subject of focus for important creative and critical scholarship beyond linguistic studies, providing a basis for more active interventions to destabilize the material nature of texts.

Scholars like Jerome McGann and Johanna Drucker, who, beginning with their earlier work in text-based Digital Humanities, offer intensive consideration of

aesthetic production and users in action – and of performance in particular – that could prove valuable to posthumanist inquiry around newly configured bodies. Jerome McGann's work at the University of Virginia's Institute for Advanced Technology in the Humanities (IATH) is notable for the work generated there in both linguistic-based study (*The Rossetti Archive*) and in using digital tools for critical interpretation of creative literary texts (*The Ivanhoe Game*). His research documented in *Radiant textuality: literature after the World Wide Web* (2001) clearly established a first-stage movement within the digital humanities to critically reflect on the implications for incorporating digital tools within literary studies for transformative practice. Although his work is not feminist by nature, or focused explicitly on gender, he does offer methods to support new performative and emergent practices unbounded by tradition. His consideration of a "quantum poetics", that is the appropriation of techno-scientific methods to explore "imaginative works", aesthetics, and interpretational models through active interventions in the text, provides a strong model for potential posthumanist study where one might reconsider how (gendered) bodies are made, and how, and from where, they can materialize (2001, xv). McGann's models are self-described as acts of "performance and interpretation", and he sees digital tools as a method to move beyond *reading* imaginative (fiction) texts and instead a means of working to actively disrupt them – or *deform* them (2001, 106). In a deformance intervention "reading along thematic lines, is itself understood as a particular type of performative rhetorical operation" (2001, 106). *The Ivanhoe Game*, for example, was explicitly constructed as space of collaborative performance where participants, assisted by computer-based technologies, worked to develop critically-self aware interventions in literary texts through acts of role-play, extreme editing, creative revision, and annotation (cultural, historical, visual). For McGann, the game's primary goal is "to make explicit the assumptions about critical practice and textual interpretation that often lie unacknowledged, or at least irregularly explored in a conventional approach to interpretational practice" (2001, 106–7). These ludic models enable forms of playful engagement and may offer models to support new feminist posthumanist interventionist pursuits. His recognition of interpretation as explicitly performative at the level of textual intervention, via machine, user, and emergent data, provides a strong foundation from which to extend such models into contemporary exploration of new material agency. Johanna Drucker, a former colleague of McGann, extended the interpretative work into the arena of "speculative computing". She outlines her research in *SpecLab*: *digital aesthetics and projects in speculative computing* (2009) and focuses on foregrounding multimodality and computational processes, beyond linguistic data analysis, to highlight visual/graphic elements and algorithmic systems in performative processes, active text-interventions and imagining new desktop encounters emerging on-the-fly.

However, the door is still open for others to move beyond the limits of computer-based interactions on screen, and they have. The critical and creative work of artists and critics like Greenspan (2011), Hight (2006), Engberg (2011), and Raley (2009, 2010) do allow more complex explorations of space and location in the world, accounting for more material complexity. Collectively, they have

designed and explored locative and augmented narratives that reconfigure the reader as user and, thus, require more critical attention to space, movement in space, dynamic engagements with data content, and radical literary interfaces to extract *meanings* from embodied encounters with emerging digital forms. Hight (2006) recognizes, in line with the new Digital Humanists, that technological development and artistic practice run parallel with each other. He claims that artistic locative narratives that incorporate technologies as a basis of their storytelling, such as with "GPS, wireless, augmented reality and more integrated visualization tools" demonstrate through their use how "functionality and readings of space and land" are reconfigured in the emergent experience of actively performing a technology-assisted reading (2006, 26). Maria Enberg, paying homage to an earlier work by Bolter (1993) in her essay titled "Writing on the world: augmented reading environments" (2011) describes in depth how in the act of *reading*, the content and surfaces for inscription in locative media are emergent, radically displaced, and accessed via embodied experiences that distribute agency among a host of synesthetic inputs. Engberg examines locative media works that exemplify "a general trend toward digital annotation and augmentation of the lived world" such as the graffiti-like animations of Argentinian-Italian artist Blu, who records his street art renderings in stop motion video sequences, and posts them online to create wordless, expressive mixed media animations that produce new sensations of location, making, space and time (2011, 56). Such works, impossible to experience without the intervention of technology to display/record/remediate it, make unclear distinctions between human and technical making and writing and reading practices familiar to print models. For Engberg, this means that Blu's work refashions space through its multimodality, becoming "what can be described as a mixed media narrative, in which location takes on an ephemeral character, somehow only truly visible through digital media" (2011, 56). Locative works such as those of Blu, along with those using more embedded technologies and narratives to reveal their content (as with GPS, AR, SMS) and reviewed in more detail by Engberg, Raley, and Hight inspire important questions for feminist posthumanist analysis. How may a user communicate knowledge and ontological understanding through live and mediated actions resonating in the body, emerging in locative encounters, but beyond traditional spatial and temporal registers and conscious semiotic construction? How may one distribute creative and productive processes among multimodal and phenomenal material affordances and apparatus?

These questions are greatly enhanced through a deeper understanding of affective digital performance and its relation to embodied being-ness across digital, human, and non-human registers and resituated in mixed media spaces and contexts. In the introduction to the *Affect theory reader* (2010), "An Inventory of Shimmers", Seigworth and Gregg describe affect as a state bound to "in-between-ness":

> That is affect is found in those intensities that pass body to body (human, non-human, part-body, and otherwise), in those resonances that circulate about, between, and sometimes stick to bodies and worlds, *and* in the very passages or variations between these intensities and resonances themselves. (2010, 1)

Deliberately construed as non-cognitive, Seigworth and Gregg outline a set of visceral and vital forces experienced beyond one's rational and emotional connection to stimuli and set in place with the circulation of affect, passing from each entity to another. Caught within an encounter of worlding, bodies and all matter of agents come together to exchange forces outside of rational, human control. Resisting pure anthropomorphism, affect of this type is never seen as abstracted from the *things* of the world. Rather it reminds us of excessive *material presence* and leaves us "overwhelmed by the world's apparent intractability" and it is, then, also "a persistent proof of a body's never less than ongoing immersion in and among the world's obstinacies and rhythms" (2010, 1). For Seigworth and Gregg affect is also a study of *belonging and becoming* and the intra-activities engaged with/by the world. Two other notable media theorists who also centralize affective becoming within mixed media contexts are Mark B.N. Hansen in *Bodies in code* (2006) and Grusin in *Premediation: affect and mediality after 9/11* (2010). They each provide frameworks to consider the importance of embodied ontological (rather than epistemological) perspectives and recursive feedback loops between humans, technology, and others. Hansen, for example, continually describes the functional-being-ness of encounters with digital technology and media (rather than knowing-ness), and he privileges visceral experiences over cognitive functions. Positioning encounters with digital media as ontologically revealing and a reiteration of a body's primal process for engaging experience, outside of consciousness, and long before representational (epistemological) understanding of the world, he highlights motor activity and one's heightened sense of the tactile when encountering virtual and physical domains as key to performing the encounter. The work of the feminist new materialists (Barad 2011; Alaimo and Hekman 2008; Smelik and Lykke 2008; Kirby 2011) also provides a strong basis for considering non-human agents as actors entangled within complex intra-active networks of cultural expressions, and their work also informs many of my considerations of intersectional power within and around media. Rosi Braidotti's work is invaluable to the new Digital Posthumanities as it is based on opposing human exceptionalism and founded in (Deleuzian) difference. Her critical trajectory is a complex cartographic journey from the 1990s onward that maps and traces topics like dissonance, nomadic subjects, matter-realisms, marking a clear feminist genealogical lineage for Digital Humanists to recover and remix. Most recently in *The Posthuman* (2013) she explores the subjectivities, politics and ethics of the posthuman subject, providing a solid theoretical model to support further feminist investigations into the shifting boundaries of human/technical/other boundaries.

Extending these interdisciplinary positions offers opportunities for constructive, active and dynamic understanding of the potentialities for a new Digital Humanities based on new materialist feminist interventions. Combining this focus on performative production through creative and critical applications and tools supports a range of critical inquiries central to contemporary digital media and culture studies, but equally relevant for feminist posthumanist review. Such inquiries may include (1) identifying the limits of organic vs. technological information space and their recursive functions; (2) identifying media-specific inscription and

narrative practices and exploring the material distinctions of each in cultural space (museum-centered, for example), in text-based (literary) contexts; and media-based (web+) environments; (3) considering the changing functions of authorship, design, and authenticity in participatory and social media artifacts and experiences dependent on user-generated content; (4) considering new material practices that lead from human-centric and patriarchal considerations of culture towards more complex considerations of (gendered) bodies and objects. Onward.

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Chapter 9
Sonic Performance and Feminist Posthumanities: Democracy of Resonance and Machinic Sounds

Milla Tiainen

As a multi-faceted problem and set of practices, *performance* has inspired many feminist approaches to music and sound. It has attracted interest across feminist music and sound studies nearly since the formative stages of these trans-disciplinary research strands in the 1980s and 1990s. Questions of musical and other sonic performance have indeed interested feminist scholars in various albeit often converging domains of the arts and humanities: gender studies, musicology and ethnomusicology, opera and popular music studies, recent investigations into digital culture, and philosophical and political theories concerned with sound and voice.

Expanding on this previous work, my prime aim in the present chapter is to begin to explore how, why and to what effect feminist studies of sound and music *as* performance might move towards posthuman/ist[1] perspectives. My reflections will proceed along two lines: I will first introduce some of the characteristic concerns and aims of existing feminist analyses of musical and sonic performance. I will then examine how developments in posthuman/ist feminisms by such research pioneers as Rosi Braidotti, Cecilia Åsberg, Elizabeth Grosz, and Stacy Alaimo demand a reassessment of these established concerns. How might examinations of musical and sonic performance enrich feminist posthumanities in turn? When pursuing this second and main line of my discussion, I will engage with two recent voice art projects that exemplify the promises and stakes of a *sonified* posthuman/ist approach. I will encapsulate these sound- and performance-informed

[1]My formulation posthuman/ist is a means of acknowledging, in the wake of Rosi Braidotti's mapping (2013, 45–50), how current feminist efforts to challenge the human- and androcentric heritage of human*ist* thought and research are a crucial part of the wider field of posthuman thinking.

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_9

prospects into two conceptual propositions: democracy of resonance and machinic sounds. The next chapter section focuses on the first line of my discussion by canvassing a necessarily selective overview of the ways in which sonic and musical performances have thus far figured as a feminist issue. In addition to the various disciplinary backgrounds of feminist music and sound scholars, this overview seeks to highlight two further things: the irreducible diversity of sonic and musical performances amenable to feminist analysis, and the many analytical and political possibilities provided by forms of performance for feminist research. I believe that an engagement with the lineages of feminist music and sound studies is indispensable for any contemporary attempt to rework the kinds of knowledge and ethico-political potential that might ensue from the study of sonic performances. This reworking is what the subsequent sections of the chapter seek to initiate vis-à-vis *the posthuman predicament* (Braidotti 2013).

Sonic Performance on Feminist Agendas

To spell out an important proviso, I endorse views of performance that do not encase it only or principally within the performing arts. This holds even if the voice art examples discussed later in the chapter might most obviously represent this domain. In order to explore the *intra-actions* – co-productive relationships (Barad 2007, 178; 338) – of sonic performances and feminist research-making, I propose it is more fruitful to adopt a broader definition of performance embraced nowadays by many Performance Studies scholars across arts and humanities. This definition conceives of performance as a wide-ranging continuum of actions and practices, of processes of becoming and generation. These include multitudinous forms of delivery, ritual and play occurring at institutional podiums and surgical theatres, on the streets, in the media, and in many other material-discursive arenas. Performance also encompasses the enactment of gendered, sexual, racialised and additional socio-historical belongings as well as the modulation of life's and the world's differential intensities in the performing arts, from dance and theatre to performance art, music and sound (see e.g. Schechner 2006; Cull 2009, 2–3; Murphie 2009, 221–222). A singular occasion often involves several aspects of this "performance continuum."

While emphasising different areas on said continuum, existing feminist and thus perceivable approaches to music and sound demonstrate the potential of performance as a powerful *figuration* – signpost for specific socio-material and political locations and related theoretical work (Braidotti 2013, 164) – in feminist sound and art studies. In music research, a shift of focus to music *as* performance has enabled feminist and gender studies scholars to challenge deep-entrenched gendered hierarchies concerning notions of musical ontology and agency. This applies for instance to studies of Western "classical" music. In this field, approaches stressing the processual comings about of music as performance have shaken the presumption that musical configurations could have a constant identity

in the form of self-contained artworks that stand ontologically apart from their contingent and allegedly secondary actualisations as sound. They have also unsettled the concomitant belief that the core features of music would derive exclusively from the activities of the composer who is traditionally considered male and highly individualised in art music culture (see e.g. Cusick 1994, 1999a). Conceived in the light of past decades' continental feminist theorising, these reassessments have challenged the operation at least since the 18th century of the phallocentric principles of transcendent ontology and self-sameness in music philosophy and practice as well as the linked, masculine-coded conceptions of musical creativity. Striving beyond these postulates, feminist approaches to musical performance have examined women's agencies and authorial scope as performers (see e.g. Abbate 1993; Leonardi and Pope 1996). They have also highlighted the integral roles of intersubjectivity, corporeality and materiality in the makings and experiencing of music and sounds (Cusick 1994; Abbate 2004; Eidsheim 2011). My own recent work on operatic performance (Moisala et al. 2015; Tiainen forthcoming) has proposed reconfigured ontological understandings of music in terms of immanence, process, and the constitutive power of relations.

Echoing the centrality of questions of the body to much feminist theorising, these questions have formed a key concern in feminist explorations of musical and sonic performance, too. Drawing especially upon social constructionist and performative theoretical stances, existing projects concerned with varied topics from Western opera to popular music studies have examined for example representations of gendered embodiment in historical musical textures and their on-stage performance (see e.g. Smart 2004). Some approaches have theorised singing styles in different musical genres as nuanced enactments of the prevalent norms of gender, sexuality, and ethnicity; the (re)production of which disciplines the very materiality of the performers' bodies and voices (see e.g. Dunn and Jones 1994; Cusick 1999b). Expanding on classical feminist film theory, several analyses have queried the maintenance or destabilisation of normalised sexual differences in sonic performances within current electronic media, whether in films, music videos, or gaming environments (e.g. Herzog 2010; Neumark 2010). Philosophical projects, like Adriana Cavarero's (2005), have wondered how our notions of political expression and subject traditionally reliant on the androcentric premises of disembodied logos and meaning might change if they were rethought in terms of sounds that are always performed and experienced by unique corporeal beings (see also e.g. Battersby, 1998, 176–181; Braidotti, 2002, 153–157; Tiainen, 2008, 147–152).

Sonic performance has thus, in a multiplicity of guises and theoretical incarnations, truly inspired feminist scholarship on music and sound. For present purposes, there are three emphases detectable from above that seem especially characteristic to feminist considerations of music and sound as performance. It is these concerns that I hope to start expanding toward posthuman/ist understandings in what follows. The first concern involves such reconsiderations of the locus and modes of musical and sonic *agency* that diverge from its previous, heavily gendered demarcations (mostly, from the prioritised and often mystified figure of the

male individual creator). The second concern has to do with *the body* as a key conceptual and empirical vehicle for rethinking the workings and impact of (musical) sounds. The third and widest concern pertains to the outlining of such epistemological-ontological approaches which, in distinction from traditional theories, would investigate music and sound as always *embodied and embedded* rather than as entities or Ideal forms whose essence could be divorced from the changeable processes and locations in which they actualise.

Towards Posthumanist Music and Sound Studies: Body, Agency and Embeddedness

In this text I want to suggest, then, that it are questions of agency, the body and embeddedness the revisiting of which might significantly help feminist music and sound studies to revamp their topics and relevance in response to current sonic practices, larger contemporary ways of living, and related theoretical reorientations. This suggestion stems from my conviction that the ongoing transformations of our realities and the ways these are being mapped by *posthuman/ist perspectives especially in their feminism-informed variations* make this sort of revamping direly needed. While discussed in more detail below, the transformations I refer to all connect to the need to question and overcome the human (with its sustained coding as male in modern Western thought) as a discrete ontological entity and unit of analysis when studying the contemporary world and its histories, also in the arts and humanities. In the rest of this article, I hope to exemplify how posthuman/ist approaches may offer feminist music and sound scholars powerful avenues for reassessing their research subjects and concepts. This holds here especially for the study of current sonic performances, and their links to the wider material and socio-political processes of today.

In the wake of the pioneering research of this volume's editors and other contributors, I understand by posthuman/ist feminist and gender studies a traversal of discussions involving a range of investigative areas from, say, the role of imaging technologies in scientific notions of the body, human and life to the challenges posed by non human-centrism for previous ethical theories. As the present volume showcases, posthuman/ist feminist and gender studies expand upon varied cross-disciplinary currents: science and technology studies, corporeal and postcolonial feminisms, continental process philosophies, contemporary and former materialisms. Yet, as Rosi Braidotti among others has argued, they share crucial allegiances (2013, 16–30). The most important of these consists probably in their ways of extending the critique of the androcentric premises of humanist thinking centrally initiated by postmodernist feminisms. Posthuman/ist studies advance this critique with conceptual-ontological models intent on further removing the human – codified principally as male, adult, white and European – from its imaginary position of existential priority and entitlement to rule over gendered, racialized and non-human others. These models highlight the fundamentally

relational and environment-bound nature of *any* modes of being, be they human or more-than-human. Posthuman/ist studies also grapple with developments endemic to current times and locations. Whether these have to do with new forms of embodiment and liveability entailed by techno-scientific practices from genetic to psycho-pharmaceutical modification or with human-induced scenarios of eco-crises and extinction, they concern, in Cecilia Åsberg's words, "the shifting relationship[s] between the human and the non-human (animal, machine, environment), natures and cultures, the popular and the scientific" (2013, 11). How might posthuman/ist perspectives both affect and become affected by feminist investigations of sound and performance?

Some recent exceptions notwithstanding (Brophy 2010; Tiainen 2013), analyses of sonic performance – whether in music, sound or voice studies – are yet to engage with posthuman/ist (feminist) theories. However, scholars in the broader field of Performance Studies have begun to work with these theories over the past years in order to reappraise the ontology and social as well as ethical roles of performance (e.g. Scheer 2012). I would argue that these investigations have produced at least two important insights also as regards future intra-actions between *sonic* performance studies and posthumanities. Firstly, and echoing the findings of posthuman/ist and associated thought more broadly, these recent initiatives have pointed out how performance was never quite the exclusively human affair it may have been delineated as. The human actors involved in artistic or other sociocultural performances have *always* undertaken their actions, sensed, perceived, and attained increased or diminished capacities in relation to non-human things and processes ranging from artefacts and specific material-temporal milieus to the peculiar abilities of technological apparatuses and media. Second, besides challenging the anthropocentrism of previous understandings of performance, posthuman/ist perspectives are inspiring a more proactive response among today's performance practitioners and scholars. Increasing amounts of art and activist projects are striving for such practices that would involve a variety of non-humans – animals, objects, the organic and inorganic materialities constitutive of a locale – as purposely engaged recipients and co-creators of performance (see e.g. Kokkonen 2014). In these instances, performances become a specific methodology for accentuating the intrinsic entanglement of human activities with other worldly processes. This may enhance increasingly difference-friendly and responsible visions of coexistence and community.

Next, I would like to try and connect these posthuman/ist reorientations around performance to feminist studies of *sonic* performance by initially envisioning how they might expand feminist sound scholarship's conceptions of agency, the body, and embedded, instead of transcendence-premised, research models. In my view, this kind of envisioning needs to build upon the ways in which feminist music and sound studies have already unsettled the primacy of the human male creative subject and sought to re-embed (musical) sonorities in bodily and otherwise situated realities, as I attempted to outline above. In addition to the theories of music and sound I have been involved with for over a decade and the recent posthuman/ist turns in performance studies, my propositions here elaborate upon approaches in

posthumanist and new materialist feminisms. I engage the ideas of such crucial proponents of these strands as Rosi Braidotti, Jane Bennett, Elizabeth Grosz, and Stacy Alaimo.

Let me start from understandings of the body. Feminist music and sound studies have over the past decades produced powerful accounts of how sound-making and sound-receiving bodily subjects materialise, experience, and contest socially coded expressions of gender and other aspects of social identity (see e.g. Cusick 1999b; Neumark 2010). Yet, I suggest these research currents would do well to join the ongoing cross-disciplinary efforts to grasp bodies anew as *becoming-bodies, composite bodies, and bodies as more-than-one*. These reconsiderations are endemic to feminist and posthuman/ist renderings of Spinoza and other process philosophers including Deleuze/Guattari and Simondon (see e.g. Braidotti 2002, 2006; Manning 2013). They share a conception of bodies as ever-modifying states and powers of being, thus emphasising the primacy of processuality. According to these views, bodies are essentially relational: they themselves consist of interrelating parts while their actual and potential states are constantly reshaped by multiple relations with other beings. Famously, these approaches champion an extended notion of the body, whereby bodies can be both human and non-human composites. Additionally, they form larger agentic assemblages with other bodies. I argue that these understandings would help feminist music and sound scholars to grasp afresh the bodies of many previously researched performance practices. Moreover, they can be of great help in accounting for emergent new practices in musical and sonic performance, such as projects by the Finnish voice artist Heidi Fast, which will be my first illustrative example below.

Views of bodies as self-varying and relation-bound connect to reworked notions of agency in feminist posthumanities. Existing feminist music and sound studies deserve praise for including performances among the key sites of musical and sonic agency in distinction from their previous undervaluing as allegedly secondary to (male-coded) acts of musical composing. Drawing on poststructuralist and related impulses, these approaches have also enriched understandings of *any* human agencies linked to music and sound in terms of their social constitution. Yet, I claim that feminist sound studies would benefit from thinking agency increasingly as not merely a human affair. Adopting posthumanist and new materialist views of agency as *any* such process of being that exhibits capacities to affect and be affected by other beings (see e.g. Coole and Frost 2010, 7–15; Bennett 2010, vii-xi) might help feminist explorations of sound to re-examine various sonic practices. These stances would also help them to grasp such recent performance practices that expressly focus on co-formative relations between humans, technologies, other non-human entities, and environments. This applies to *The Algae Opera*, an experimental music and media art project that premiered at the London Design Festival in 2012. It will act as my second illustrative example below.

What I hope both of my examples will briefly demonstrate through their singular exemplifying powers (Massumi 2002, 17–18) is that in order to engage with current performative and socio-material realities, feminist music and sound studies would benefit from updated notions of embeddedness. Following Braidotti (2005,

209–211), this would entail the development of enlarged, non-human centric senses of site-specificity and ontological inter-relationality in connection with musical and sonic performances. The following last section of my article will zoom into the two voice art examples named above. In order to illustrate how music and sound studies might not only gain from feminist posthumanities, but how they might also add unique nuances therein I will bring up the two conceptualisations listed in the beginning of this article, one in relation to each example. The first, *democracy of resonance*, pertains to posthuman/ist views of agency and the body encouraged by sounds and recent sonic art, here especially by Heidi Fast's projects. The second conceptualisation, *machinic sounds*, relates to the ways in which experimental sonic performances, here especially *The Algae Opera*, may promote non-human centric and *trans-corporeal* understandings of our embeddedness in the world and the ethical import of this.

Exemplifying Sonified Posthumanities

Heidi Fast's Co-attuning Voices

Active both in Finland and internationally, performance and sound artist Heidi Fast has over the past decade developed site-specific voice art projects and research. The vocalities of her practice are typically non-verbal, at least partly improvised, and sung. Fast herself (2010 and 2015) has characterised them as emergent forms of singing and "vocal voice matter." The materiality of vocal sounds – their actualisation as vibrations and sensorily perceived sonic qualities – is clearly important for Fast's work. She (2015) has recently described the vocalities of her musical performance art in terms of "variations of intensities and vibrations" that affect their producers and recipients along several dimensions ranging from the cellular level of bodies and the parasympathetic nervous system to consciously felt and signified experiences. The vocal voice matter of Fast's projects is often inherently co-produced. Many of her art processes are based upon singing that she practices *with* the participants of these events, or which she encourages the partakers to improvise in relation to each other's vocalizations, her own vocal initiatives, and the spatio-material milieus involved. Live vocalisations often mix with pre-recorded sound materials.

The emergence and materiality of vocalities entangle in Fast's art with broad social-philosophical concerns, which she strives to engage with in ways that would be immanent to the particularities of sonic performance. These concerns partly derive from the work of such thinkers as the Italian autonomist social theorist Franco "Bifo" Berardi (2009). Inspired by this work, Fast is interested in the elemental roles of *sensitivity* and *sensibility* in collective and individual processes of being especially within current urban environments and Western, late and cognitive capitalist ways of living. In Fast's conceptualisation, sensitivity refers to sensation as initially a-conscious intensity. Sensibility concerns in turn the

capacity of subjects or actors to respond to their fellow beings and environments. While bodily and sensorily based, this responsiveness is shaped by socio-economic and cultural dynamics and carries significant socio-ethical implications. (Fast 2015.)

More precisely, Fast is interested in the changes that sensitivity and sensibility might be undergoing in contemporary life characterised by constant technological mediation, the proliferations of the infosphere, and multi-platform communication over long distances. Her hypothesis is that daily involvement in these processes might have both overwhelming and impoverishing effects on individual and collective sensitivities and sensibilities (Fast 2015). This does not mean Fast would commit to a reactionary stance nostalgically lamenting the loss of a previous stage of humanness that was less mixed up with technological networks or during which human bodily, symbolic, and socio-economic activities were supposedly easier to distinguish from the non-human processes of machines, such as those of current computational media. Instead, and significantly for potential *sound-informed* feminist posthumanities, Fast's notions of sensitivity and sensibility stress the fundamental contingency of human ways of being upon their associated milieus. These milieus by definition comprise a range of registers: economic, organic, sociocultural, symbolic, and inorganic material. Indeed, the notions insist that individual and collective human beings cannot but individuate from within wider relationally forming systems of social and material processes, data, and tendencies. For Fast, then, sensitivity and sensibility are our most immediate interfaces with the world.

These notions connect to Fast's own conceptual creation of "co-attuning voice" (Fast 2015). This concept is among her key means of trying to encapsulate the peculiar ontology of the voice and the aims of her sonic art. The co-attuning voice is connected to Fast's emphasis on how voices as enunciation and sound epitomise the "ontological relationality" of reality (see Braidotti 2013, 190), including sensitivities and sensibilities. In the wake of many thinkers but with a fresh artistic and conceptual twist, Fast conceives of the voice as a relational instance par excellence. In her words (2010), vocalisations (as indeed sounds at large) are essentially "inter-spaced". When spreading out as vibrations and sensed qualities, they travel across manifold spatiotemporal entities in one go. They therefore inherently confuse such stratified divides as interior/exterior, origin/recipient, and human/non-human. As Fast (2010) puts it, vocal sounds "resonate" both the actors that emit them and those other material and sentient f/actors – buildings, plants, technological sound transmission media, human listeners – who partake in the vocal event. It is these participants' capacities to register and respond to the vocalisations at stake that become co-constitutive of the sounds' very powers of existing. This is what I take co-attuning to refer to: voices are capable of affecting diverse beings at once by involving them in shared contact with sound. The beings that vocalise and dwell within the voice's reach each attune to it, and to each other, in some manner stretching from physical to more complex experiential resonances. Yet, the process of attunement is not uniform. The voice affects each participating f/actor divergently according to the latter's different material constitutions and proclivities for action, other relations, embodied and lived pasts, and so on.

These conceptions of voice link back to ideas of cognitive capitalism and potentially overburdened or impoverished sensitivities and sensibilities. Namely, Fast believes, and has been supported in this by feedback from her projects' participants, that if produced experimentally in terms of their sonic form and collective modes of generation, vocalisations may help to re-attune the relations between fellow humans as well as between the human and non-human elements of particular material-social milieus. Even if fleetingly, they may help to challenge such relational organisations that have become normative and hence constricting of the participating elements' capacities to affect and be affected. What Fast (2010) hopes to incite through co-sung vocalities are such "moments of transsubjectivity" and "light, temporal communities" which would contest our more normalised ways of co-acting with other humans, machines and sites in current city spaces, communicative life, and social institutions from workplaces to hospitals. Her projects seek to subtly expand both the involved humans' scales of sensitivity and sensibility and the ability of the non-human partakers – like spaces and the technologies used to process sound – to influence what happens and how human agencies take shape. So far, Fast's projects – whose vocal materials comprise pedal point-like tones, brief melodic passages, hums, sighs, breathing, and more – have included for instance "vocal walks" in European city centres. These walks have endeavoured to sonically reconfigure the cohabitations of these spaces by human individuals and groups and non-human constituents from buildings to natural life and sounds (see Ouzounian 2009). Most recently, Fast has arranged singing workshops with the patients and spaces of Helsinki University Central Hospital's Psychiatric centre.

Elaborating on Fast's (2015) notion of voice as an invoker of "resonance field[s]," I propose that her performances convey a posthuman/ist ethos we could summarise as *the democracy of resonance*. Instead of confining the voice exclusively to individual human expression or the domain of meaningful speech (logos), as historical accounts have done (on e.g. Aristotle's views, see Dolar 2006, 105–107), her projects locate voices' affective capacities on enlarged continua of human and more-than-human co-constitutive intra-actions (Barad 2007). Be they provisional social collectives or material and acoustic peculiarities of spatiotemporal sites, no resonating f/actors of Fast's projects are categorically prioritised over others. Thus, my use of the term democracy in relation to her art does not refer to equality premised on the putative common essence of things. It points to how these performances harness the voice as a means of exploring the "ruling" of reality by incompatibly different processes which nonetheless resonate – affect and become affected by – each other.[2] Also, insofar as Fast's projects associate the capacity to sense and actualise in relation to others with both human and non-human beings, they espouse understandings of the body and materiality akin to

[2]My use of the term 'democracy' is linked to a relational ontology of mutual inclusions, which is in critical tension with Levi Bryant's take on this term in *The Democracy of Objects* (2011). Bryant's object oriented approach reinstates a distinction between a being's primary essential and merely secondary relational characteristics whereas the ontologies of process and relation espoused in this chapter posit that any being is comprised of actualisations and differing potentialities which are constitutively affected by the relations in which it resides, or becomes.

posthuman/ist feminist insights. Indeed, the kinds of sonic performances exemplified by Fast contribute to ontological accounts of both human and other material entities as "vibrant matter" and of vibrations as key vectors of relation and transfer between beings, which have been lately developed by Elizabeth Grosz (2008) and Jane Bennett (2010) among others.

Fast's projects clearly accord agency in the sense of processual and relational affective powers to both human and non-human beings. Yet, it is the re-constitution of human actors from within these interrelations that forms her main focus. Let me therefore conclude the chapter with a brief turn to my second performance example, *The Algae Opera*. It illustrates how sonic performances may have veritable significance for our earth others (Braidotti 2013) and our interdependence with them, and how these performances might thereby instigate posthuman/ist ethical insights and practices.

The Algae Opera

First performed in 2012 during the Digital Design Week at London's Victoria and Albert museum, the music and media art project *The Algae Opera* relocates the operatic singing voice in unprecedented connections. These connections unfold between actors from markedly different fields of expertise and registers of reality. Mezzo-soprano Louise Ashcroft is the project's most conspicuous human performer. Its other human collaborators include the conceptual artist and designer duo Michael Burton and Michiko Nitta, a musical composer under the pseudonym of Gameshow Outpatient, an actor who performs as chef, and audience partakers. The project's integral more-than-human participants include a purpose-built biotechnological suit and mask designed by BurtonNitta and worn by Ashcroft, a fertiliser, and algae, which are a photosynthetic plant-like organism. During the performance, Ashcroft vocalises a musical piece co-created by her and the composer. Meanwhile, the biotech-wear she is clad in connects via tubes to the algae, which are located in tanks next to her performance podium. The tubes transport the carbon dioxide of the singer's exhaled breath to the algae with pronounced efficiency.

The main task of *The Algae Opera*'s cooperative of new biotechnology, human corporeality and sound is to advance the growth and taste of the algae. This aim relates to questions of food economy, emerging ecocrises and ecological sustainability informing the project. As Burton and Nitta state on the project website,[3] the algae involved in the performance have been estimated as an important future food source for the earth's populations. The way Ashcroft vocally nourishes the algae and modifies their taste (as experienced by human eaters) draws for its part upon recent research on sonic food enhancement; Burton and Nitta claim they identified the operatic singer as the "perfect body morphology" for forming a symbiotic relationship with the algae due to the lung capacity and modes of

[3] http://www.burtonnitta.co.uk/algaeopera.html, Accessed 29 November 2015.

vocalisation characteristic of this style of singing. What sonic performance thus does in *The Algae Opera* is experimentally foster such plant bodies and attendant prospects of biodiversity that may in turn be significant for the survival of human – and other animal – populations on planet earth in the face of human-induced ecosystemic mutations and downright disasters. As a literal taster of this relational potentiality, the actor-chef participating in the performance prepares sushi out of the sound-modified algae. The project's audiences – above all human, but possibly also other animal – can thereupon "consume" the singer's vocal-musical "talent" in a new register, as the website puts it.

Despite highlighting the co-constitutive relationships between humans and non-humans, *The Algae Opera* could be argued to still resort to human-centred conceptions of reality and more-than-human nature. After all, the ecologically sustainable practice of food production it envisions is construed most obviously from the perspective of human survival in the age of deteriorating biodiversity caused by human actions. Yet, I claim the project also contains potential for challenging the epistemological, ontological and ethical impasses of anthropocentrism. This is because it exemplifies the *trans-corporeal* conditions of both human and non-human existence. To paraphrase Stacy Alaimo's definition of trans-corporeality (2008, 259–262), the project's set-up foregrounds the fundamental interchanges between human bodies/agencies/lives and the more-than-human world – manifesting in processes of environmental pollution, human breathing, eating and health, and the contextual co-adaptations of these and many further processes – which are a topical concern for material and posthuman/ist feminist approaches. In relation to this, *The Algae Opera* can be seen to advocate "an environmental ethics of partnership" (Alaimo 2008, 246). This ethical approach underlines the embeddedness of human ways and potentialities of being in the enrichment, impoverishment and/or transmutation of other modes of existence, and vice versa. Trans-corporeal ethics admit the limits of human knowledge in foreseeing how specific interdependencies will play out since they are multi-causal and temporally evolving processes. Simultaneously, the aim is to seek such coexistences that would advance the being of as many involved participants as possible instead of basing the existence of the few prioritised on the maximal exploitation and even destruction of others.

To conclude, I would offer that *The Algae Opera* provides a distinctly sonified perspective on trans-corporeality by experimenting with the *machinic* nature of vocal sounds. To draw on Deleuze and Guattari's (1987, 4–5; 22–23; 88–90) concept of machinic assemblage, voice in this project is machinic because it does not possess a pre-established distinct identity as a classically trained vocality with a largely pregiven range of material features and aesthetic, social functions. Instead, this voice becomes: it attains a particular mode of being and powers to affect within the entire ensemble of co-influencing elements this very project involves. These stretch from the purpose-built technology to the ways the project's musical textures were composed in intra-action with the algae and the kinds of utterances their growth best seemed to respond to (see the website). What *The Algae Opera* ultimately exemplifies, then, is how sonic performances may make important contributions to the actualisation and futures of posthuman/ist feminisms and relational, ethical practices.

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Chapter 10
Intersections: The Animal Question Meets Feminist Theory

Lynda Birke and Tora Holmberg

Introduction

How can we conceptualize relationships between humans and other animals historically, materially and culturally? And, more specifically, how can we understand such relations in feminist terms? Animals play crucial roles in human lives: we use them for food, clothing, medical research, entertainment, education, recreation. Moreover, we mirror ourselves in other animals: in them, we see similarity and difference, and thus also our own superiority. The complex, shifting, and often contradictory relationships between us and other species are the focus of a growing area of academic inquiry, known as human/animal studies (HAS); here, we draw on this research to consider what a focus on human/animal relations brings to feminist theory. Both feminism and animal politics have concerns with questions of power albeit in different ways: how, then, can they influence each other?

As feminist theory has expanded its remit and embraced diversity, it has challenged the position of humanity as the center of all life on earth, and come to recognize the interconnected exploitations of different humans as well as other animals, nature and terra at large. Here, we will outline three areas that, in our view, connect feminism and animal studies and raise questions for both. These are: identity politics, embodiment, and accountability – including the related question of rights. There are of course other areas that could possibly be explored (affect, voicing, control, etc.). What we want to do is to point out a few fruitful interconnections. Through exploring these connections and disconnections, between the

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_10

interdisciplinary fields of feminist and human/animal studies, we argue for an intersectionality which includes species.

Like feminist studies, HAS involves multidisciplinary inquiry. What HAS brings is a specific focus on animals and humans *in relation*; it takes nonhuman animals seriously as subjects who engage, or not, with humans in multiple ways. Such mutual, embodied communication is crucial to our relationships with what Haraway (2003, 2008) calls *companion species*. Using the example of human/dog relations, she emphasizes our mutual embeddedness in histories of shared engagements, and calls for a relational ethics. We humans relate to dogs in multiple and intersecting ways, not only through one-to-one friendships with particular dogs, but also through enfolding with them at many levels, in networks of connections (from breeders and pet food manufacturers to park wardens).

Bringing animals into focus as social actors raises many issues for humanities, social science, and politics – all of which have traditionally excluded them. This exclusion has been true also for feminism. Yet, although the trajectories of feminist concerns and human/animal studies have been different, and there is sometimes tension between them, we believe that there is a strong kinship, and a theoretical base for understanding interspecies relationships in feminist terms. This can entail multiple spaces and scales; from global to inter-personal levels, in institutions or organizations, from historical to contemporary or even future concerns.

Human/animal relationships are profoundly connected to other oppressions, including sexism (Cudworth 2011). Connections between gender and animality have been explored by several ecofeminist writers (e.g. Adams 1990; Gaard 2011), who have pointed to the ways that both women and animals become subordinated. Alongside that work, there has also been resistance to naturalizing ideologies, especially those that imply linkages between animality and women. Relatedly, the sex/gender distinction has contributed to the disconnections with animal theory (Holmberg 2008, 46). Animals, like sex, were seen as firmly belonging to "nature." But that division has been challenged in many ways, from acknowledgement of the cultures of, for example, laboratory animals (Birke 2003; Holmberg 2011), to Haraway's insistence on the entwinement of "naturecultures" (Haraway 2008), to Hayward's recognition of cross-species perception in encounters with marine life (Hayward 2010; Hayward and Ah-King, this volume). There is now more recognition that human exceptionalism is itself a socially constituted order – a naturalized ideology – which can be understood as maintaining specific social norms. Yet there are limitations to this work. Deckha (2012), for example, argues that feminist interventions around species have made insufficient impact on animal activism and ethics, and have not been sufficiently intersectional, sometimes excluding race and culture.

Here, "intersectionality" may provide a promising, feminist posthumanist approach to human/animal relations, taking account of various forms of naturalized social orders. Feminist theories of intersectionality offer ways to explore complex relations of gender, race, class and sexuality. They are not, however, unproblematic (Lykke 2005; McWeeny 2014) – not least because they generally disregard nonhumans, and rarely consider how human power is materially constituted through animal bodies. It is precisely these considerations that HAS can contribute to feminist

inquiry. How can we consider, "the interaction of multiple identities and experiences of exclusion and subordination" (Davis 2008, 67) if we take species into account? How good are our theories at recognizing our situation as one species among many? This is a considerable challenge, as feminism has dealt little with species diversity or explored how exploitation of nonhumans cross-cuts and co-constitutes other systems of oppression.

Such questions can greatly enrich feminist thinking. We can view human/animal relationships as intersectional and performative, such that species intersects with gender/class/race and other structures of power (see Cudworth 2011). Human–animal relationships can be seen as performed and "animaled" (Birke, Bryld, and Lykke 2004); they are intersectional rather than analogical, meaning that different axes of power relations intersect, transforming practices and discourses. In what follows, we explore three areas in which feminist and animal studies share common ground, in order to highlight intersectional connections.

Identity Politics

Pivotal to understanding human/animal relations as intersectional, is to understand species as kin, in itself as relational (Charles 2014). Many of us live in multispecies households, raising questions about how sociality is constituted, and how categories are negotiated. Our relationships with animal companions are, moreover, freighted with ideas of gender and identity (for example, with horses: Birke and Brandt 2009). Here, we focus on one example where gender intersects with ideas of animality and family, around women and cats.

The phrase "cat lady" – title of a Canadian documentary (2008) – can invoke a lascivious, feline, image or it can imply someone who lives with many cats. The latter is often seen as lonely, ill or crazy, with a void filled by cats. Two contrasting woman/cat relationships emerge in the documentary. One is epitomized by Margot, who returns home from work to her three cats. Her apartment features cat portraits and show rosettes, and thus portrays her through her interspecies relationship. The cats appear well-groomed, content; Margot arrives and talks to them, so that they appear as her valued family. But only up to a point. Speaking of her lack of human friends, she says, sadly, "a lot of people don't know, that I am as lonely as I am" (Cat Ladies 2008). For her loneliness, cats are inadequate substitutes.

The second example is epitomized by Diane and her 132 cats. They live, unsurprisingly, in chaos, some in cages, but many running around, behind furniture, or under beds. Diane, too, moves constantly, feeding, cleaning, giving medications. Recognizing that it has got out of hand, Diane says she must stop helping the cats and start thinking of herself; she appears to have lost control of her life, and the cats now control her. Like other "cat hoarders," she is unable to care for her animals – or herself. Here, there are not only intersections of human-ness/femininity and animality/felinity, but representations are also intersected with age, social class and place (for extended discussion, see Holmberg 2015).

The film exploits several interspecies, intersectional identity markers. Diane is stressed, rushing around like her cats, but she is also portrayed as a victim of circumstances. Gender and class interact with this animaling process, so that Diane becomes a helpless woman in relation to the cats who take over. Margot, in contrast, appears as an inadequate woman who "mothers" cats instead of children. Moreover, the place called home looks very different in these two stories. Margot's apartment seems feminine, intersecting with her cat mothering identity, while Diane's chaotic house is dominated by the lives of the cats, producing a troublesome identity – a woman without a home, yet not homeless.

When these cat ladies appear as home bound, irrational and out of control, they seem to lose something of their human status. And if they lose humanness because of their lack of conspecific relationships, the cats lose their pet-ness. Hissing cats in cages conflict with ideas of domesticated, docile pussycats. But even the human-made, babied cat breaks with the ideal image of the pet. The examples clearly show that pet categories as well as human ones are contingent positions – their boundaries can be moved and renegotiated (Holmberg 2015; Redmalm 2013).

The cats in these stories emerge as both victims and abusers, as well as sentient agents. Feminist analyses of these embodied power relationships might question linkages between gender and sentimentality evident in these narratives. From a HAS perspective, we might add that representations of cats as frivolous, deceitful or magical, on the one hand, and mothering and homely, on the other – intersect with historical split identities of the feminine as (sexually) uncontrollable/virtuous mother.

The category of "human" is, ideologically, historically and practically contingent on separation from, yet dependent upon, non-humanity. Similarly, the category of "animal" is multiple and gendered. Representations structure and are structured by normative narratives about humans, animals, nature and society. Haraway points out that narratives should be understood in terms of their material-semiotic presences and effects (2008); in constructing an identity of "animal," we produce human exceptionalism. It is ironic that, as feminist theory has strongly emphasised difference, it has so easily reproduced the animal other as a singularity. And this is a political move. As Peggs (2012) argues, "human" is a political identity precisely when it is mobilized in opposition to the interests of other animals. However, as the brief example on cat ladies above is intended to highlight, identities are multiple and fluent. Intersectionality, in our view, must include a broader critical approach to modernity, purification, taxonomies and identity politics, and aim at providing alternative subversive performances. Thus, there is a pressing need to extend our theorizing to take seriously multiple subjectivities, whoever they are, and more-than-human dynamics and embodiments.

Embodiment – Intercorporeality

Embodiment has long mattered to feminist theorizing. In HAS, too, scholars have sought to understand how corporeality and affect impact upon interspecies communication (e.g. Acampora 2006; Donovan 2007). Both have invoked the idea of

"intercorporeality," to reference how bodies can affect one another, in many contexts. Between species, this might for example include the incorporation of one body into another through food consumption (Buller 2012); it might include the myriad relations implied by "companion species" (Haraway 2008), or Hayward's (2008) description of the "impressions" of cup corals and scientists. It can also encompass close, tactile, one-to-one physical activities, such as horse riding (Birke and Hockenhull 2015; Smith 2011).

These diverse contexts convey the profound embodiment of social relations, whether with people or other animals: communicating, especially with nonverbal others (young children, nonhuman animals) means using the body, becoming intercorporeal – what Smart (2011) refers to as "bodily ways of knowing," enacted through the body. It is precisely those embodied ways of knowing that matter for our engagement with nonhuman animals; they can mediate interspecies communication, as well as making power explicit through the body and its comportment (cf. Butler 1993).[1]

In perceiving others' actions, we engage with them: to become within these social encounters is also to become a body and to make oneself available to the becomings of others, whoever they are and whatever their perceptual skills.[2] This entails not only reading and understanding bodies across species lines, but also moving/affecting other bodies, and allowing oneself to be moved/affected in turn (Despret 2004). The resulting multisensory dialogue is evident when we watch humans and dogs interacting (e.g. Sanders 1999; Irvine 2004). Higgin (2012), in his study of guide dogs and their people notes how both must learn to walk in rhythm, to be cognizant of the other; their bodily understandings are, he stresses, *affective*, reflecting an ability to affect and be affected. Affect, in other words, is produced and experienced relationally and intercorporeally, through experiencing bodies in connection.

One clear example of intercorporeality and mutual communication comes from horse riding, involving direct contact and bodily motion of both human and animal. Riders speak eloquently of feeling "one" with the horse, of moving "in synch" (Game 2001; Argent 2013), anticipating and knowing within one's body how the other will move. It's as though horse and human – at least partly – embody the actions of the other within themselves. When working well together,

[1]Butler (1993) emphasized how cultural norms materialize gendered bodies. No doubt we also materialize oppressive practices toward animals through our bodily comportment; certainly, animals (e.g. cows, horses) respond differently according to human body posture (e.g. Birke et al. 2011).

[2]Other species do not always share the traits we primarily use for perception and communication – not all mammals for example have binocular vision, something which profoundly shapes our (visual) view of the world. Yet there is enormous common ground. And millennia of shared lives has resulted in some species becoming adept at recognizing our meaning. Dogs, particularly, can easily read human gestures (Topál and Gásci 2012). These skills are critical to interspecies communication. Humans, of course, can also build relationality at a distance, by means of technology. Even so, the technologies we have depend upon the human body and its particular capabilities (e.g. vision, hearing).

actions of human and nonhuman are not forced but co-produced.[3] Even when the person walks alongside, movements may be coordinated (Birke and Hockenhull 2015) – a kind of bodily meshing, in which horse and person pay attention and work together.

There is a mutual entwining here, reflecting neuromuscular patterns, as well as mutual affect. Agents are not bounded individuals, in this view, but spill over into other's experiences, directly affecting each other. Stuart (2013, 314) speaks of a "union between two nervous systems" implicit in ways that teachers of postural techniques work with clients, in co-activity. She emphasizes bodily mutuality, depending upon interindividual, physiological, resonances. In the intercorporeality of human/animal relationships, there is similarly a dialogical relation, a neuromuscular dynamical flow. Although multisensory, it is particularly affected and effected by touch. The shared, balletic, flows of horse and rider in dressage, for example, emerge from tactile sensations, shared histories and understandings, as well as physiological capabilities (see Lagarde et al. 2005). Although intercorporeality is emphasized, even eulogized, in both HAS and feminist writing, its meaning often remains nebulous. If horse and human, or person and dog, are moving together, there are profound material changes going on, biological flows which both produce and are produced by the encounter and which transcend the individual bodies; there might, for instance, be echoing changes in nervous system function, immune responses, or hormone release.[4]

Despite earlier fears about essentialism, feminist theorists are now much more willing to engage with biology, to refuse to put it into boxes, and to think of the body as highly permeable and plastic (Frost 2010; Shildrick 2010). These diverse insights could open up interesting ideas for HAS, particularly for those of us whose focus is close interspecies encounters. What precisely does it mean when riders speak of "feel" for the horse, in terms of bodily experiencing, through muscles, nerves, sinews? Certainly, animals often readily pick up nonverbal and unintentional cues from human bodies: horses, for instance, increase their heart rate if the human handler's heart rate goes up. Slight changes in human muscle tension are easily apparent to the animal, even if all that links them is a lead rope.

Feminist theory around embodiment, with its growing willingness to think across divides, can offer insights into human/animal relationships as intercorporeal. So, too, can animals contribute to feminist thinking. First, for example, the exquisite sensitivity of many nonhumans to our actions, *even before we do them*, underscores the importance of nonverbal, bodily ways of knowing, which produce co-actions. Such cross-species mutuality challenges individual (human) cognition and rational

[3]We acknowledge here that there is some degree of domination, in that animals have fewer choices and are located firmly within a sociocultural framework in which animals are, indeed, dominated and abused. Nevertheless, there are possibilities, sometimes, for companion animals to experience pleasure in relatings with us (see Cudworth 2011) – and perhaps even to enjoy shared activities.

[4]The hormone oxytocin, for example, often called the "bonding hormone," is released by both dog and person when they gaze at each other (Nagasawa et al. 2015).

language as the bases for sociality. Secondly, thinking about nonhuman animal embodiment challenges intersectionality, as McWeeny (2014) emphasized. Debates about intersectionality, she argues, can lose sight of specific bodily experiences/harms. She draws on ideas from ecofeminism and the colonial/gender system to argue that our bodies are "related to that of others through lines of intercorporeal relations that collectively form topographies of flesh" (ibid, 269). For McWeeny, these lines of intercorporeality include nonhumans, whose bodies, experiences and oppressions are as fully implicated as those of humans.

In addition, HAS scholars have shown how humans, too, have the ability to sense the wellbeing of other animals through their bodily demeanor (Wemelsfelder 2012). These intercorporeal sensations are of course embedded in webs of power . For example, returning to the cat ladies above, the interplay of knowing and sensing works in relation to the phenomenon of cat and dog hoarding assessment, through "sensuous governance" (Holmberg 2014), reinforcing hegemonic norms of proper living and human/animal relations based on sensually constructed knowledge. This term refers to the ways in which experts use sensing through seeing, hearing, feeling and sniffing as a means of knowledge and as a method of management: knowledge, senses and power go hand in hand. However, animals play important roles in the governance of hoarding. In the hoarding context, cats and dogs also perform certain feralness, most often refusing to collaborate with authorities. Ideas about intercorporeality and interspecies impressions can thus contribute to intersectionality – especially when interspecies encounters are taken into account. Various human and animal bodies – in this particular case, cats, human authorities of different kinds and so-called hoarders – interact and produce knowledge about the situation. As in the case of human/horse relations above, intercorporeality is produced in between human and nonhuman actors, albeit within different degrees of freedom between intersecting axes of power.

Power and Responsibility

How can we understand power relations as both producing and constraining issues of life and death? If nonhuman animals are crucially part of social life, then there are moral implications. To what extent can they be accorded "rights," even citizenship? Discourses of animal rights are problematic; first, they are based on negative rights, rather than saying anything about positive relational duties (see Donaldson and Kymlicka 2011). Second, from feminist perspectives, Braidotti (2008, 106) notes that rights discourse derives from liberal, humanist perspectives which are saturated with masculine norms and hopelessly anthropocentric (see also Wolfe 2003; Acampora 2006; Donovan 2007). In addition, Haraway (2008, 297) argues that animal rights discourses are closely related to right-to-life arguments – if animals obtain rights, should foetuses have them too? Haraway suggests, somewhat controversially, that feminists should instead attend to developing responsible practices – including politically charged ones such as breeding, meat production, animal experimentation and slaughtering.

Responsibility, Haraway points out, builds on response. Such a capacity can be shared only in and for multidirectional relationships, in which always more than one responsive co-actor is in the process of becoming. That means that human beings are not uniquely obligated to and gifted with responsibility; animals as workers in labs, animals in all their worlds, are *response-able* in the same sense that people are; that is, responsibility is a relationship crafted in intra-action through which entities, subjects and objects, come into being (Haraway 2008, 71). Humans and other animals are thus response-able, meaning that since they have capacities to respond, they also need to be responsible.

Although Haraway's terminology might suggest that relations are non-hierarchical, she acknowledges that they are embedded in power (see Cudworth's [2011] critique of Haraway), and that interests will always conflict. Taking this standpoint seriously, it means that humans in general have a greater response-ability for humanimal relations. Having responsibility/response-ability implies an ethic of care. For example, Donovan and Adams write that "attention" is a key term when it comes to a feminist ethics of care, including, "attention to the political and economic systems that are causing the suffering" (Donovan and Adams 2007, 3). Systems that cause suffering include meat production; thus, they argue for vegan feminism. Unlike Haraway's demand for responsible practices, they – as many other feminists writing about animals – see food production as inherently violent (e.g. Adams 1990; Curtin 2007; Donovan 2007). Food practices, they argue, must be seen as part of a feminist ethics; for these authors, responsibility means avoiding using animals for food altogether. Relatedly, having responsibility implies political and social obligations. Animals in general may not be able to resist their oppression collectively (though some do individually, with varying success). It has been argued that nonhuman animals fruitfully can be viewed as co-citizens (Donaldson and Kymlicka 2011), as members of a shared social life (e.g. companion animals), or whose sovereignty should be respected (animals in the wild). To think about other species as part of our collective social lives is to think intersectionally.[5]

HAS, like feminism, has roots in political activism. Whatever position one takes in relation to animal politics, there is a principle behind it of trying to organize politically on behalf of animals – of trying to do "something for animals" – which matters. To have an ethics of care, to be responsible, also means being accountable – in academic terms, that includes accountability to the subjects of our inquiries. This issue has been much discussed among feminist scholars, debating how to do responsible research, that is accountable to the people studied (Skeggs 2001). Accountable research, feminists usually argued, was research that rejected objectivist assumptions that researchers could stand apart from their subjects. It was, furthermore, research which involved the subjects at different stages, as well as involving the researcher in the communities being investigated.

[5]However, this perspective could be accused of speaking to the same liberal ontology that we argued against above. What would a politics that can take collectives into account look like (see Holmberg 2015)?

There is an ethics of care implicit in these feminist debates about accountability, which could usefully inform HAS (see Birke 2009). However much we study human/animal relationships, we might also ask, "what's in it for animals?" To think about that question is not only to ponder what they might think about it, but also to consider whether our investigations can help to bring about change – in the ways we think about them and their abilities, in the ways we treat them, in the ways we respect – or not – the places they live.

Accountability is not easy, and there are inevitably imbalances of power – whether those studied are human or not. In this context, it is important to remember Spivak's (2006) theorizing on the subaltern and the voices that they are being denied. Should/could "we" ever speak for "them"? Nevertheless, we would argue that accountability is an important issue that animal studies scholars can usefully glean from feminism (see Birke 2009). It is, moreover, also the question of accountability to others, including nonhuman others, that continues to provide a significant challenge to feminist scholarship, we would argue. It is not enough to talk about how our lives connect with those of other species, if we remain oblivious to the politics of such relationships – essentially, one of exploitation. This would simply be an intellectual exercise, leaving our theorizing unaccountable. We need of course to keep in mind that although our relations with other species are primarily exploitative, embedded in myriad layers of domination, there may also be affection and love within specific relations – as many of us who share our lives with companion species would attest (see Cudworth 2011). And, to complicate the picture further, feminist thinkers have taught us that love and care does not exclude power relations. On the contrary, caring relations are by definition asymmetric, although not always in ways we can predict.

Conclusion

Human/animal studies and posthumanist feminism have many, in our view, underexplored intersecting points of interest. Power relations, naturalized ideological and capitalist systems as well as more cultural and symbolic dimensions, bring the two areas together. Despite this, while gender and feminism have had at least some impact on the interdisciplinary field of animal studies, the role of other animals in feminist theory has been a rather invisible one. What HAS largely recognizes is the *sentience, agency* and *cultures* of nonhuman animals. Abilities to feel and suffer, or to work and play together – to thrive, matter (Haraway 2008). In Haraway's view, part of that lesson is to stop thinking about humans and animals as culture and nature, as "us" and "them," and to start considering all relations as intersectional (2008, 18). Species, race and gender are relational rather than analogous. Women, for example, are not (treated) *like* animals in pornography and trafficking; similarly, industrial meat production systems, including abattoirs, are not *like* Nazi concentration camps. These and other profoundly troubling phenomena must be analyzed in their own context, otherwise we will

contribute to the downgrading of other animals, and as a paradoxical consequence, of downgrading humans, while losing some essential insights into humanimal becomings in that specificities may be lost. This is why debates about intersectionality need to take into account all those who can *feel*, or *engage with others*, whatever their gender, race – or species. These other sentient creatures co-produce sociality and culture alongside us (Bekoff 2002), and we should properly recognize that mutuality in our politics, and consider its implications.[6]

If we emphasize intersectionality in posthumanities research and feminist posthumanist theorizing, and seek to understand the multiple and complex ways that power structures cut across or complement each other, then we must recognize where other species are situated in those power structures. This is where insights from HAS scholarship can help to inform feminist inquiry; not only does HAS work to trace the complex ways in which nonhuman lives are entwined with human ones, but its activist connections remind us of the politics. Nonhuman animals in our techno-industrial world are increasingly commodified and disempowered. Similarly, certain categories of humans are dehumanized and disempowered. The "anthropological machine" that produces the contingent boundaries surrounding the category of the human (Agamben 2004) works in both ways. Indeed, it is precisely for this reason that we are wary of some versions of posthumanist scholarship; whatever the philosophical promises, posthumanist theorizing risks overemphasizing the political potentials of transgressing bodily boundaries through for example biotechnology, without reflecting on the patterns which allows some bodily boundaries to become transgressed without consent. This is where feminist theorizing is crucial, keeping a critical eye on the multiple power relations producing knowledge, bodies and cultural representations in certain directions and not others.

It is equally important that feminists engage with emerging debates about the cognition, sentience and emotions of other animals (Bekoff 2002), as is currently being done in other fields within new material feminism (see Braidotti 2008; Shildrick 2010; Alaimo this volume; Hird this volume). To ignore nonhuman animals, or to allocate them to an unchanging nature, is to engage through naturalizing ideologies, as acultural or even asocial: and that is a political move, serving to reinforce human domination. It is not compassionate, nor subversive. And nor can politics which excludes power relations regarding species be called a feminist politics.

We have a strong conviction – and hope – that we will see more of human/animal relations in feminist research, with the current posthumanist and materialist "turn."

[6]There is growing recognition of animal sentience in legislative systems – European legislation, for example, acknowledges animal sentience. But there are also increasing demands for at least some species to be accorded rights broadly analogous to human rights (great apes for instance). For further discussion of the issue of animals and citizenship, see Donaldson and Kymlicka (2011).

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Chapter 11
Archaeological Posthumanities: Feminist Re-invention of Science and Material Pasts

Christina Fredengren

What is Posthuman in Archaeology?

One may wonder what post-human theory grounded in the present day predicament characterized by bio-political management of lives, genetic manipulation, nano-technology and climate crisis can contribute to archaeology and also what archaeology can supply to post-anthropocentric understanding of the world?

It can be argued that archaeology is an anthropocentric field of study. According to Pollard and Bray, it is defined as "the complete study of human society in the past through an interpretation of its material remains" (2007, 246). The discipline studies both pre-history and more recent pasts. Archaeology can provide alternatives to written history as it works with material pasts and trace events and practices not always captured in documentary sources. However, as Chakrabarty problematize, "The discipline of history exists on the assumption that our past, present, and future are connected by a certain continuity of human experience" (2009, 197–8) and a too anthropocentric archaeology would be burdened with a similar logical challenge.

It is clear that archaeology deals with materialised history, looking at how people interact with things and how materiality facilitates a variety of actions in different time-periods. With the material turn (see Webmoor and Witmore 2008; Olsen 2010), the enquiries have taken a greater interest in material agency, vibrancy and flow as well as in re-thinking the human in archaeology. There is a need to consider both what the archaeological records consist of and what kinds of narratives are produced through engaging with the archaeological material (Lucas 2012; Fredengren 2013; Alberti, Jones, and Pollard 2013).

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_11

The focus on the man-made environment separates archaeology from, for example, geology that focuses on the natural environment, and students of archaeology are trained to trace and map out effects of human action on the landscape. In effect, such archaeological practices also produce a distinction between nature and culture. However, the insight that boundaries between humans, animals and the environment are blurred (comp. Barad 2007; Alaimo 2010; Braidotti 2013) challenges the traditional core of the discipline. Archaeology has a long-term relationship with the sciences. Over time, there has been tensions between scientific archaeology, leaning towards a realist understanding of the world and the social constructivism prevailing in the more humanistic strands of the archaeological debate. However this division may have led to an underestimation of the potentials for the subject to be a place where "species and cultures meet" in order to discuss deep time history (Solli 2011, 49, 54). There are links to geology where bedrock and sediment analysis provide material for understanding settlement and farming. Environmental investigations based in for example archaeobotany build up long-term knowledge of human-nature interaction. Bones of humans and animals are studied in osteology to determine for example sex, age and health patterns. Furthermore, bodies and identities are in focus for biomolecular approaches such as isotope analysis and DNA analysis. On the one hand, the discipline is a part of disciplines that perform a division between nature-and-culture, but on the other hand, it also focuses on the inter-linkages between the two.

While osteology and isotope analysis are not deemed controversial, the use of DNA analysis is more disputed. Debates about the DNA technique and the challenges of having different epistemological approaches have taken place in the last decade (Renfrew and Boyle 2000; Shennan 2002; Welinder 2003; Kristiansen 2004). However, more recently these techniques have also been questioned due to presumed racial analogies and essentialist claims (Åsberg 2005; M'charek 2010; Cassel 2011). It is clear that some of these tensions derive from how identity and personhood are approached in archaeology. In order to move on from this position there is a need to question the relationship between constructivism and biological determinism and to deal with the nature:culture divide and to see what a re-envisioning of this as a continuum would bring about, the same holds for a re-configuring of what we understand as the division between life and death.

Archaeology deals with trying to understand former lived lives and it often does that through dealing with death, burials and decay. The discipline is a vista where death and death-studies are in focus and where practices of dying and mourning can be considered. Furthermore, the archaeological material lends itself to the study of necro-politics, here understood as the exercise of the right to take a decision on who can live and who must die particularly when dealing with organised human and animal killing, as in war activities or sacrifices.

Post-humanism as a theory opens up for alternatives in understanding how bodies work in relation to the environment and provides alternative ways for understanding power formations where human and non-human actors intermingle and thereby alter how we understand nexuses of change in the past, present and future. This means that it is time to move beyond discussion of identity and personhood in archaeology and to understand the historicity of rather complex

subject-positions where the composition and materiality of bodies matter (comp. Braidotti 2013, 99–102). This paper aims to examine how critical posthumanism can be useful for navigating between the sciences and humanities when discussing bodies, subjectivities and ethics, looking at the use of common scientific methods in archaeology such as radiocarbon-dating, isotope- and DNA-analysis. A major question is "who" is materialized through the use of science in archaeology? I am curious to probe into what difference it makes to investigating the body from a perspective where you are gendered down to the bones (Butler 1999 [1990]) in comparison to having history tattooed on your body (Braidotti 2011, 14). Also, what is increasingly important is to investigate how archaeology deals with life and death matters. Here Braidotti's (2011, 2013) thoughts on vitalism, bio-politics, and necro-politics could take the discipline a step further and start to discuss how post-humanism could take on board a historic dimension and deal with deep time.

I will argue that there is a need for archaeology to move from discussing identities and personhood to taking on board the term "figurations" in order to take responsibility for the mapping of historical subject-positions that are not purely anthropocentric. Also, there is a need to re-invent how we look upon lively material pasts, in order to see how the past interferes with the present and where our archaeological bodies, materialites and temporalities projects and have agencies in a variety of futures.

Body and Science in Archaeology

Gender, identity and personhood have been dealt with in a number of archaeological publications that focus mainly on humans. Identity is described as self-view or what distinguishes groups of "us" from groups of "them" (see Jones 1997; Insoll 2006). Increasingly the term "personhood" is used, indicating an interest in how existence is dependent on relations with others. It is also acknowledged that the establishment of a person is a question of how someone is accepted and conceptualized in various communities (Fowler 2010). Personhood can be shaped by dress or gear, but also through other interactions where gender, age and tasks matter. Hence, material objects added to the body add to the social persona and this knowledge is often based on what is found in burials.

However, there has been a growing interest in the body in archaeology with regard to understanding how bodies have moved through space in phenomenological studies and with regard to how the body has been socialized through various practices in lived lives (see Sørensen 1995; Joyce and Meskell 2003; Gilchrist 2009; Dommasnes et al. 2010) as well as how diverse ways of understanding the body have gone from being appreciated not as epistemologies, but as coexisting modal ontologies sustained by different materialities (see Harris and Robb 2012). One example is that artefacts, such as wedding rings or prostheses that have been added to the body, can become so entangled with a person that they deserve to become a part of a burial (Sørensen 2013, 8). Damm (2012, 126, 131–132) has suggested that people have a multitude of situated, shared and overlapping identities formatted through material networks. Such

networks can, for example, be observed through archaeological distribution maps over type specific tools, such as a particular set of fishhooks used in the circumpolar area. Here the human subject formation is extended well beyond the body, through materialization processes into the landscape.

Gendered Down to the Bones?

Sofaer (2006) has remarked on the gap between osteology as a science and the social constructivist approaches in other parts of archaeology. Osteology could then take on Butler's argument that also biological sex is socially constructed, down to the bone so to speak, where gender is constantly performed and acted out in the body (1999 [1990], 9–11, 45–49; see, for example, Joyce 2000 for use in archaeology). In a Butlerian way, biological sex determinations of osteology and DNA would be considered as variants of socially constructed gender. Following this reasoning, it is often argued in archaeology that gender is a socially constructed category built through historically determined power structures, where material culture, sites and landscape were used in the formation of the cultural concepts of "man" and "woman", or any other category from a large variety of gender categories (see Nordbladh and Yates 1990) which would not necessarily be connected to the biological sex determinations.

In the 1990s when Butler argued that also sex was a social construction, the corporeal re-emerged in feminist studies (Braidotti 1994; Grosz 2004). The challenge was to theorize the physical materiality of the sexed body, while avoiding biological determinism (Lykke 2010, 204). Instead of deconstructing sex like Butler did, Braidotti emphasized the need to repossess the historicity of various female bodies and to "assert the specificity of the lived, female, embodied experience" (1994, 100). As noted by Haraway, social constructionism leaves the sexed body as a "blank page for social inscriptions" (1991, 197) (see also Barad 2007, 150–151). To maintain the gender category without acknowledging biological sex may in fact sustain hierarchies that feminism was meant to change. By ignoring "sexual difference" such a perspective fails to deal with how patriarchal norms are projected on to most bodies (Lykke 2010, 121). In archaeology (Fahlander 2012, 142–143) has advocated a corporeal approach where the materiality of the body and sexual differences may be understood as facilitating certain actions and restraining others. For example, height improves capacity to reach, where "average" traits of women and men are brought in so as to "resurrect" the dead bodies with their action capabilities in order to extend the archaeological analysis, however based on such aggregate of averages.

There is a need to "get real" also in archaeology. However, this demands taking the materialization of bodies seriously and acknowledging both situatedness, stability and variance in subject formation over time. Barad argues that not even atoms have distinct ontological identities. All bodies (human and non-human) come into being through intra-active material-discursive entanglements (Barad 2012, 32), i.e. out of mergers between concepts and materiality. There is a need to move out of

the essentialist position with fixed identity categories, focusing on bodies as historically formed nexuses. Archaeology then needs to take into account both how body materiality and social practices coincide in the skeleton. This means taking steps beyond averaging body assemblages and taking on board that the history of the body is a set of relations at many different levels.

If we were to explore what being an embodied female has meant over time, this would be a history of an on-going differentiation process. Human bones are objects that change both during a person's life and after death. It is clear that both the male and the female morphology change over time and that a woman in a specific Mesolithic context could be configured differently compared to an average modern female. It is worth noting that the sexing of some skeletons from the Mesolithic has given contradictory results when compared to modern skeletal assemblages. One example is the osteological examinations of the skeletal remains from Store Mosse in Scania, where the postcranial body was judged as female by observing birthmarks on the pelvis, but the craniums had developed coarser male characteristics following evolutionary processes and/or activities such as chewing sinew or meat (Nilsson Sjøvold, and Welinder 1979, 234). At the other end of history, in the medieval period, male skeletons from certain regions are more gracile (Kjellström 2005). In effect the physical skeletal realities of being female or male in the Mesolithic would differ from the physical skeletal realities in later periods. Furthermore, the form and structure of the skulls of elderly females tended to accumulate male features (Meindl et al. 1985). The skeleton change during the life course with regard to male or female characteristics, where on occasion the skeletal differences even out with age.

The Body and the Beyond

Alaimo has described the human body as transcorporeal, where the boundary between the body and its surroundings are blurred; "biology and politics merge as people, places and substances merge" (2010, 2, 22).

The analysis of stable isotopes of carbon and nitrogen tells us if a person's food came from marine or terrestrial resources, and where from in the food chain, as in a vegetarian diet, or if it consisted of meat higher up in the food chain (see Eriksson 2013). The results are captured in the saying "you are what you eat" (see Schulting and Richards 2002, 153). Furthermore, both strontium isotopes from bedrock and oxygen from water are being incorporated into the bones and can be used to see the substitution between the body and the environment. Strontium is infused continuously in the skeleton thus reflecting the more recent food sources' geography, whereas strontium values in the teeth, that developed in childhood, represents the geography of the food sources from that part of the life-cycle. This can thus be used for discussing mobility and migration (Brown and Brown 2011, 82–87), as the bodily imprint of earlier locations lingers on in the body. As Alaimo argues, "'the environment' is not located somewhere out there, but is always the very substance of ourselves" (2010, 4). Hence, biomolecular archaeology maps how food, bedrock and

water would have materialized and transformed the body. Rather than seeing the body as a stable entity it is understood as being porous, with a constant interchange with the surroundings. It can be argued that these laborative measurements represent identities. However, they actually inform us about more than this. They can be understood as mapping transcorporeal relations with the environment that perforates the body surface. These analyses maps relations to particular types of food, various animals or places in the landscape and are ways to fold out embodied historically situated, multiple relationships, action capacities and belongings. Hence, history is not only tattoed on the body, but also entangled within and through the body. It can be captured as gatherings, formed by waterways, geologies, and a variety of human and more-than human relations, that can be traced as archaeological landscapes within.

But it is important to take a step further in the analysis and ask who came to access what food, who dwelled permanently in the landscape, and who had to move? Such mapping is a method to examine geo- and bio-political relationships, where food and the landscape are re-enacted in the body to become a part of the personhood in material ways. These biomolecular analyses can facilitate a discussion such situated networks that run through the body. To discuss the body as a transcorporeal assemblage that comes into being with multiple others (an assemblage here means an effect-producing gathering (see Deleuze and Guattari 1998, 3–4; Braidotti 2013, 82, 100) would be a way to focus on the body as a permeable space where various actors co-work in forming the person, which also has recursive effects beyond the person. This is by no means contradictory to the extra somatic (add-on) personhood that has been discussed above in archaeology, but rather an expansion that takes into account exchanges with other species as well as the environment and how they coincide within the body.

Messed up DNA

Both the extreme positions of biological determinism (where social identities are determined by presumed natural biological traits such as sex, race and disability) and cultural essentialism (where a background in a particular culture determines identity, and gender roles are seen as prescribed within a given culture) are problematic (see Lykke 2010, 23–24, 203–204). The use of DNA is also critiqued at an overall level and it is perceived that "archaeogenetics lacks a consistent theoretical framework" (Oliveira 2008, 111). Mitochondrial DNA is used to trace a direct maternal line and the use of Y-chromosomes to show male lineage. The results are often communicated by a family tree of genetic lineage (Åsberg 2005). The family tree with a common ancestor was an idea mobilized politically in both imperialism and colonialism during the 19th century (McClintock 1995; Åsberg 2005, 245, 252–253; Cassel 2011). As has been pointed out by M'charek (2000), population genetics uses one particular part of the DNA sequence and not the full amount of genes present in the biological being to form lineage tree maps. While such relations may have been important, they downplay care and respect built on other grounds such as relationships to other species and things.

The sorting of DNA in tree structures could be analysed by making use of the contrast between arborescent and rhizomatic thinking, whereas "unlike trees or their roots, the rhizome connects any point to any other point …" (see Deleuze and Guattari 1988, 5–7, 21). The use of DNA to trace genealogy could be understood as a form of arborescent, linear and hierarchical thinking, rhizomatic research maps other possibilities and searches for messier connections. The latter approach would investigate relations in a horizontal way, asking questions about what networks made this person come into being and thrive. This may imply conceptualising the beings we study as intra-acting assemblages in both the exterior and the interior. There is a transcorporeal aspect of genetics that needs to be discussed as the body consists of DNA from more than one species. Haraway (2008, 3–4, 31–32) describes the human body as consisting of 90% of other genomes than the human, such as those of microorganisms, bacteria and fungi which are important for our existence. In the human body, for example in the intestines, there are also traces of other animals, parasites and diseases, some of which may work in a beneficial way for the body and others with malevolent effects on health and life. Recent analysis of DNA in dental plaque (Adler et al. 2013) provides evidence of such intra-actions and the co-working with bacteria related to shifts in diet. In these cases the bacteria has become such an integral part of the body that it still remains in the skeleton's DNA and thereby is an example of how there is a life-changing entanglement between the human and bacteria within the body. Besides this DNA from animals, plants and humans can be found distributed in faeces, soils and sediments (Hebsgaard et al. 2009). This so-called dirt DNA attests to how bodies become distributed in the landscape, in the environment, and could be used to understand the bio-politics of who was where and at what times.

DNA can be used for sexing skeletal material incorporating chromosomal variance such as XXY and XYY (see Skoglund et al. 2013). It can be debated whether DNA really provides a final judgement on sex as compared to osteological determinations or other relations and activities important for making up personhood. There are many actors that co-work to form female subjectivities. Finding a Y chromosome is an indication that shows a body had the possibility of becoming a man. However, bodies are full of potentials that may or may not be realized in various historical settings. There is not always a correspondence between genotype and phenotype, i.e. the hereditary aspects may be expressed differently depending on circumstances. However, this does not mean that DNA analysis should be disregarded. On the contrary, science is important as it contributes together with other mappings to an understanding of rather complex subjects.

DNA is also used in archaeology to look at appearance and to establish hair, eye and skin colour (see Draus-Barini et al. 2013). The statistical models used in DNA counts can also be set at looking at factors such as genetic diseases and disability. Here, too, the question of constructivism contra materialism as well as that of ethics is at play. M'charek (2010, 316–319) has studied the use of facial reconstruction, osteology and DNA of a human body found in Eindhoven in the Netherlands and its role for Dutch identity. She showed that the person who emerged from the analysis was affected by the tension between western and Muslim history and a wish to find a healthy body with white skin. However, this does not mean that appearance

analyses should be avoided as skin or eye colour may have been socially charged in the past. To use DNA for investigation of appearance may be a way of understanding mechanisms of racism and discrimination in the past and at the same time acknowledging physical realities of the body, but DNA on its own reveals a partial picture and does not directly translate into identity.

One way out of the essentialist dilemma is to discuss these bodies, not as identities or personhoods, but as figurations (Braidotti 2002, 3; Haraway 2008, 4), which would be history-specific knots of tissue, being the result of a range of different actions and relational processes with human and non-human agents that disperse both within and outside the body. An archaeological figuration is then a curated facticity that comes about through materialisation processes that have been ongoing over longer periods of time, together with those practices and discussions that actualise it in the present time. Such figurations act to highlight transformative bonds between past, present and future within the body. However, the selection practices around what types of bonds that are promoted and which are ignored need critical review and ethical response. The figurations themselves may be anywhere from gatherings of contradiction, hope, despair or oppression.

Mattering of Life and Death

The most well known isotope analysis in archaeology is radiocarbon dating. The method makes use of the production of ^{14}C in the atmosphere that comes from cosmic energy. This produced ^{14}C is taken up by the body through food and it becomes a part of the metabolic cycle. Here metabolism is understood as one of the vital processes necessary for the survival of all living organisms. Death, in these circumstances, is understood as when the metabolism of the body ceases and together with that, the intake of ^{14}C (see Taylor 1987). *When death occurs, the metabolic uptake up of radiocarbon ceases. The amount of radioactive ^{14}C will accordingly decrease in the tissue. The time elapsed since the death is thus reflected by the remaining radiocarbon activity in the body*. After some 5,700 years the levels have halved compared to what they were at the time of death.

However, the border between life and death is a matter of intensive philosophical debate. Braidotti (2013, 120–121) has pointed out that much political philosophy is fixated on seeing death as the finitude of a being. The effect of this is a politics of "loss and melancholia" which is focused on rights and compensations rather than focussed on relations and responsibility in zoe-centred egalitarianism. Instead Braidotti (2013, 56–57, 138–142) argues for a material-vitalist notion of death where life-death is seen as a continuum of generative forces. Against a post-humanist background the scientific analyses of bodies in archaeology should perhaps not first and foremost be seen to exemplify the life and death of individuals per se. Such an understanding would be based on a principle of dualism, performing a clear-cut separation of groups of "living" from groups of "dead". On the contrary, these analyses instead work with how the body is material, encompasses

a variety of temporalities and forms a part of the environment and the atmosphere. As discussed above, exchanges with the environment continue even after death. One could say that to some extent the corpse is still alive inside as it continues to emit energy and to exercise agency long after death. Thereby, archaeological finds can work as "unexpected encounters with deep time" (see Fredengren 2016) and have the potential to interfer with and animate a variety of futures.

Where does this reasoning place archaeology? Lucas (2012, 258) has described archaeological interventions, such as excavation, survey or laboratory analyses, as re-materialisation processes that activate the archaeological material in present day contexts. This means that material assemblages formed in other times may continue to have agency within present or future assemblages. This could be taken to mean that to a certain extent material history is not gone but mixed with other components. In case of the analysis of bodies, the archaeological body while buried continues its agency through slowly becoming a part of the earth or the water. But by use of excavations, analysis and scientific methods such bodily remains are re-contextualised and become a part of other material assemblages as well as influence the narratives of the present. This is why it is important to scrutinize how these are composed and what implications they have for the formation processes of the past, present and future.

Chakrabarty (2009, 219) makes a case for the need for deep history where disciplines such as archaeology, geology and history need to co-work, not least to understand how environmental and other challenges are entangled and can be disentangled. However, the world "without us" that Chakrabarty refers to is already here as the human body is constituted by a series of deep history formation processes and also there may not always have been a uniform human present to perceive or play a part in such past events. To that extent that "us" may have been configured rather differently in the past. Braidotti (2013, 121–122) urges us to see ourselves as already gone and such a position would be the base for a zoe-centred sustainability ethics. The archaeological materializations processes show that to some extent we are already gone in a material sense, while the dead are in some ways still alive, emitting radioactivity. The human experience is materially mediated both in the body and beyond, and also constituted by formation processes that stretch deep in time. Humans are, in fact, already thinking and acting through the environment.

It is Timely…

This paper has examined how critical post-humanism can be useful for finding paths in-between body essentialism and social constructivism in the use of archaeological sciences dealing with the body. It shows that a range of sciences used within archaeology, such as osteology, isotope analysis and DNA, can be re-invented through a post-humanities framework of thinking. This means moving beyond understanding the scientific results as information on identity and taking them more seriously as historical, geographical, lived figurations. Archaeology is then about the materialisation processes of history and about taking into account the variation in subject formations over time. A challenge is then how archaeological studies can

provide alternative, affirmative and boundary transgressing figurations, as well as to investigate positive and negative power formations with deep roots.

As a discipline that deals with history and materialisation processes, archaeology is thus able to provide analyses of materials and chains of cause and effect that stretch back in time and deal with deep history. At the same time, the persistence of the effects of such materiality implodes the linearity of time.

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Chapter 12
On Preparations: Engaging with Inhuman Materialities

Myra J. Hird

Field Note: Kingston, Ontario, Canada – 14 Jun 2007

How do I prepare for my fieldwork: a year in Distinguished University Professor Lynn Margulis' laboratory? I've read *Laboratory Life* (1986), but I don't want to be an anthropologist of science. I'm not sure what I have in mind, but something more like Mackenzie and Murphie's "engagement." I have a passport and map to get through New England, an old undergraduate microbiology textbook, running shoes, a recent book on earth systems science, diapers for my son and pull-ups for my daughter, a new laptop, a camera, my family, a book contract, emails of unfinished business, a bicycle… Somehow this doesn't seem enough.

On Preparations

Between 2001 and 2011, Peter van Wyck travelled what has become known as the Highway of the Atom (2010). van Wyck's research took him to the Déline community and the Eldorado mine at Great Bear Lake, Hay River, Norman Wells, Inuvik and Fort Smith; to the North West Territory Archives in Yellowknife, the Canadian Mining and Energy Corporation's archival material in Port Hope; museums in Los Alamos, Albuquerque and White Sands; the Nevada Test Site, and Yucca mountains; and Greenland. *The Highway of the Atom* is, as van Wyck sees and travels it, an ethical journey or sorts: "a story about the aporias of responsibility… about the infinite character of responsibility" (2010, 3). An ethics that can only be understood, and experienced perhaps, from "having been somewhere" (2010, 4). An ethics dependent upon place. An ethics of modest witnessing (Haraway, 1997).

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_12

Van Wyck prepared for his encounter with a Geiger counter, shotgun, and various other object companions. And this got me thinking: what are my preparations for a journey into materiality and the inhuman? Put another way, upon which ontologies and epistemologies do I draw sustenance? What relationships do I navigate between epistemology and ontology in the laboratory, field, text and other sites from which I draw my research?

Field Note: Rutgers University – 11 Apr 2013

I have just given a talk on the social life of bacteria, trying my best to convey a rationale for my enthusiasm for these minute critters (see Figure 1). Because it's not like polar bears or bonobos, whose "big like us" status (as Lynn liked to say) seems to be a prerequisite for human interest and caring (and even then only in particular contexts). I have described alternate evolutionary accounts of the appearance of sexual reproduction amongst certain species, and a senior scholar in the audience asks me how I define the term "sex." I can tell from her question she's a scientist, and it turns out, she is a biologist. I am so pleased she has attended my talk and I say that I think interesting questions may be asked as to why biology uses particular definitions, and to what ends. Some time later, she emails:

> …I think interesting questions may be asked as to why biology uses particular definitions, and to what ends. Where to start? With Aristotle? Or others of his ilk? [O]r with a long essay on how scientific language attempts to work with stipulated definitions for its terms terms, etc.? If I may generalize, most scientists don't stop to ponder about the social/cultural/intellectual implications of their jargon. Hence the value of having outsiders shake up the process now and then. But if you shake it too far, it ceases to be what you started

Fig. 1 Miller/Urey-type vat, Margulis Laboratory. Image by Myra J. Hird.

> with. I find that feminist jargon often seems irrational, which I guess is the point. So I retreat into my laboratory, culture my fungi, and happily interrogate their genes and metabolism using controlled experiments, vocabulary with stipulated definitions to describe their behavior, and get joy from adding little insights to our understanding of how molds cope with survival, sometimes by biosynthesizing molecules that do bad things to people.

Representing

In *Representing and Intervening* (1983), Ian Hacking argues that scientists represent, or theorize about the world, and they intervene in the world through experimentation. For Hacking, posing a question about the relative value of theory over method, or which precedes the other, is misleading "because it treats theory as one rather uniform kind of thing and experiment as another" (1983, 162). Feminist and other science studies scholars are interested in how science and engineering both represent and intervene as mutually constructed and co-implicated processes driven as much by paradigms (Fleck 1935/1979; Kuhn 1962/1970) as they are by technology (Pickering 1985).

Adrian Mackenzie and Andrew Murphie (2008) argue that the social sciences tend to analyze these processes in three ways: critique, extraction or engagement. Critiques of science, write Mackenzie and Murphie, include analyses of scientific rationality (Popper 1934; Fleck 1935/1979, Adorno 1956; Latour 1987; Agamben 2003) as well as analyses of the processes of scientific knowledge and objects. Extraction is interested in using scientific concepts within philosophy (Whitehead 1979; Deleuze and Guattari 1987; DeLanda 2000). The direction of critique and extraction is almost always *from* science *to* social science. Finally, engagement attempts dialogue, conversation and collaboration with science and engineering (Prigogine and Stengers 1984; Haraway 1992; Latour 1999; Barad 2007): "it engages with science-in-the-making and it has had to formulate questions about how to live in or with science collectively" (Mackenzie and Murphie 2008, 89).

My educational inheritance propels me towards the road most travelled: critique. The microontology (Hird 2004a; 2009) I am continually evolving engages in critiques of science and engineering: those epistemic cultures, gender relations, changing orders and so on that build and rebuild the fabric of the scientific and technological enterprises. In *The Origins of Sociable Life* (2009a), my conduit was symbiogenesis theory's ambivalent status within evolutionary theory, which offers insights into themes familiar to social scientists such as the genesis and development of scientific facts, and scientific epistemic cultures. My critique identifies a number of agential cuts (Barad 2007) that have occurred through scientific (including measurement, technology and objects), political, social and cultural processes, to define living and nonliving organisms, and more generally, evolutionary theory itself. My aim is not to pronounce the validity or invalidity of symbiogenesis theory *per se* but rather to contemplate questions about how science processes theory and data, as well as some of the more germane implications of symbiogenesis theory for the social sciences: the organism as unit, sexual difference, and environmental change.

My evolving microontology also *extracts* a number of concepts from science: self, other, symbiosis, Gaia, waste-world and so on, in order to contribute to the social sciences' long-standing theorization of these concepts within the fabric of social relations. Learning the language of science and engineering, I relate to Haraway's (1992; 2008) remaking of "diffraction," Barad's (2007) use of "indeterminacy," and Pickering's (1985) "mangling." And I see where Deleuze derived so much of the material found in *Difference and Repetition* (1995), and in Deleuze and Guattari in *A Thousand Plateaus: Capitalism and Schizophrenia* (1987).

Yet, my main objective is to *engage* with materiality and the inhuman. Microontologies requires a world of actants building and destroying allies in messy relational processes. I proceed from the premise that phenomena are always already intra-acting in relational materiality (Barad 2007), and an inherent suspicion towards individualism, difference as ontology and so on (Hird 2013a). I try to move toward an inhumanism, while all the while recognizing that my main epistemic window into the microcosmos is science and engineering (Margulis 1981). As such, I need to learn unfamiliar languages and ways of knowing. I need to take science and engineering seriously. And I need to take what science and engineering take seriously, seriously.

Field Note: Analytical Services Unit, 14 Oct 2012

I can tell Jane (a pseudonym), an engineering PhD student, is embarrassed as she carefully explains the steps of the experiment (see Figure 2). Jane is trying to get to what she thinks is *significant*. Her research explores the migration of three emerging contaminants of concern (*carbon nanoparticles* (CNP), *Bisphenol-A* (BPA) and *polybrominated diphenyl ether* (PBDE)) through landfill geomembranes and geosynthetic clay liners.

She rinses the flask six times, pours in something, adds something else, and then pours this mixture into the bigger rounder flask. And then rinses the flask six times. Why six I ask? Jane pauses. "Because that's what you do," she answers a little awkwardly. I think I've asked another question she's not expecting. I don't think I'm supposed to ask this question. I am a professor and Jane is a PhD student, and I'm not supposed to ask such basic questions. But because I am a professor, and she is polite, she stops the experiment to try to explain. "I rinse the flask six times to make sure it's clean. To clear away any left-over residue." But why six times precisely, I ask? Because I've been watching and it's always six: not five, not seven. Always six. "Well," Jane reaches into the dim past of her undergraduate training, "because that's what I was taught." "Why do you think it's six times, though?" I can't seem to let this go, and Jane is confused by my focusing on this seemingly inconsequential non-part of the experiment, rather than the *clearly* much more germane and interesting thing going on, which is the experiment *itself*. Hacking, Haraway, Schrader, Pickering and others swirl around in my head, and I think the six is tremendously interesting. It means something.

Fig. 2 Analytical Services Unit, Queen's University. Images by Myra J. Hird.

Field Note: Analytical Services Unit, 9 Dec 2012

I'm pleased to see my presence is no longer of any interest to anyone. Today Jane is showing me how the data from the centrifuge – the material spinning around in the test tube is made into numbers by a machine – is inputted into a computer program in order to produce a *result*. Jane shows me the numbers her experiments over the past year and a half have produced. These, she says, she compares with the numbers other researchers have produced in experiments using the same procedures. Most of the numbers match (not exactly, it appears to me, but enough that their difference is not significant, according to a statistical rule), and when they don't, Jane adjusts her numbers to fit the standardized ones. Now *this* is interesting, and I ask Jane to explain this operation to me several times. Surely this is what Ian Hacking meant by "representing *and* intervening."

Intervening

Ian Hacking (1983) draws attention to a long-standing prejudice for knowledge derived from *representing* phenomena (theory) rather than *intervening* with phenomena (method). Distilling this prejudice, Hacking asks "Do measurements

measure anything real in nature, or are they chiefly an artifact of the way in which we theorize?" (1983, 233).

The laboratory provides an ideal space to study the minutia of everyday scientific research; that is, how scientists and engineers intervene (see Latour and Woolgar 1979; Knorr-Cetina 1981; Collins 1985; Lynch 1985; Traweek 1988; Pickering 1999). For example, the Margulis Laboratory is a place, to borrow from Donna Haraway (2008) and Karen Barad (2007), where naturecultures intra-act: pictures of Margulis amid rows of scientists at various meetings (she is typically the only woman in these pictures); scores of honors tucked behind fridges containing various microbial communities; scientists; cameras; termites; Petri-dishes; theories; unwashed dishes; solar rays; janitorial staff; undergrad and graduate students; runaway cockroaches escaping from neighboring labs; a murky Miller/Urey-type vat; generous amounts of dust; computers; music; pens and paper and so on.

In their analysis, Latour and Woolgar note that scientists "spend the greatest part of their day coding, marking, altering, correcting, reading, and writing" (1979, 48–49). Data gathered from laboratory discussions and so on is transcribed from spoken to written word. Machines – mass spectrometers, for instance – transcribe raw material into dots or lines on graphs. Through these transcriptions, scientists produce *matters of fact*.

Scientists do not use machines, calculations and so on to discover already-existing entities; rather, their own inscriptions produce entities. Inscriptions, here, mean all the processes scientists go through to produce matters of fact; that is, how images produced by cameras attached to microscopes, smudges on graphs, and so on are made to mean particular things. For this reason, Hacking (1983) argues phenomena are *created* in the laboratory, and Louis Pasteur famously said, "In the fields of observation, chance favors only the prepared mind" (in Vallery-Radot 1916).

But it's more than this. Phenomena are produced through the intra-action of always already entangled entities (Barad 2007). Scientists and engineers rely heavily on technology, such as microscopes and telescopes, to see objects and their interactions. Hacking argues we do not actually see with a microscope. According to the President of the Royal Microscopical Society:

> …microscopic vision is *sui generis*. There is and there can be no comparison between microscopic and macroscopic vision. The images of minute objects are not delineated microscopically by means of the ordinary laws of refraction; they are not di-optical results, but depend entirely on the laws of diffraction. (in Hacking, 1983, 187)

Diffraction refers to the apparent bending of waves (light, sound, etc.) when they encounter small objects. Haraway (1992) uses diffraction as a way of reading one thing through another. She writes: "Diffraction 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" (1992, 231).

Microscopes explicitly require, Hacking argues, *interfering*: "The first lesson any scientist learns about microscopes," Hacking explains, is that we learn to "see through a microscope *by doing*, not just by looking" (1983, 189). Or, as Fleck wrote, "to recognize a certain relation, many another relation must be misunderstood, denied, or overlooked" (1935/1979, 30). Learning to see is as much about over-looking some observations as it is about concentrating on others. This tacit knowledge must be part of my engagement with bacterial assemblages. The world is made up of phenomena born of contagic intra-actions, and humans are not the only entities making phenomena.

Field Note: Godfrey Landfill Test Site 7 Jul 2010

The civil engineer meets me at the edge of the field. Here I am, in my steel-capped boots, fluorescent jacket, and hard-hat (see Figure 3). I have completed the hazards certification, and now I'm trying to remember the details of the hazards I need to watch out for. We walk up to the top of the hill, and the engineer draws my attention to various liners (different materials with different qualities); the angle of the hill in relation to the sun's rays; where the aerial blimp hovers overhead to take photographs; the network of liner wrinkles that stretch before us; the edges of the site where frogs and other small animals sometimes hop or slither on to the thick black liners and die in the heat of the sun; the workmen (they are all men) who are using some kind of machine specially designed to melt the liner edges together; men using a bigger machine to roll out liner like a carpet; the edges of the construction site towards the horizon, the owners of which have lent the engineer and his team this land on which to experiment; the trickle of water moving this way and that, finding its way to lower levels, and so on. I ask about nails, soil composition, number of graduate students working here, the history of the site – anything I can think of to show that, while I may be naïve, I'm paying attention.

Fig. 3 Godfrey Test Site, Godfrey Ontario. Image by Myra J. Hird.

Being Interested

I have often been asked how I "gain access" to my field sites, and I tend to reply that I ask. Truthfully, it's more than this. It's about *being interested*. Spending time in laboratories, hanging out with scientists and engineers over coffee and lunch, attending seminars, looking over shoulders, opening refrigerators (asking first), talking to technicians, poking around – being there. Being there is crucial, and non-transferrable. It's about "having been somewhere" as van Wyck learned on the *Highway of the Atom*. One has to live with uncertainty to stand around, listen, observe, and ask questions. What sustains my willingness to live with this uncertainty in the research process is my abiding *interest* in what's going on. I am at times bewildered, frustrated, awestruck, ambivalent, and incredulous; but I am never bored.

What enables me to move from a critique of science and engineering to an engagement with scientific and engineering practices – and what I'm really interested in, which is the matter they engage with – is a yearning for what Haraway calls "response" (2008, 226), and the crux of this matter is that while we humans are representing and intervening, so too are all other critters, as, indeed, is the geologic (Hird 2012b).

Field Note: Swimming with Bioluminescence, Marine Biology Laboratory, Wood's Hole July 2007

It's early morning, still dark, and Lynn is going swimming in the ocean, and apparently, so am I. I don't have a bathing suit so she lends me a t-shirt someone has made for her, appropriately adorned with drawings of bacteria (see Figure 4). We head down to the ocean, pick our way across some rocks, and make our way into the water. Lynn swims out some way but eventually comes back and tells me about bioluminescence in organisms, which, naturally, turns out to be all about bacteria. Bioluminescence is an outcome of a bacterial process known as quorum sensing, which is a kind of long-range chemical signaling when bacteria reach high densities. Not only do the bacteria communicate with each other through quorum sensing, but the bacteria within fish communicate with the light organ of the fish, which spurs the fish to grow to maturation (i.e. without these bacteria, the fish don't mature). The illumination also confers survival advantage to the fish because the fish becomes less visible to predators.

Becoming Already Bacterial

Responding is what Thomas Nagel (1974), Timothy Mitchell (2002), and Ian Bogost (2012) mean when they consider what it's like to be a bat, a malaria-carrying mosquito, or a lampshade. My research (see for example Hird 2012a,

Fig. 4 Myra J. Hird and Lynn Margulis after swimming at Wood's Hole. Image courtesy of J. Maclaren.

2013b) is concerned with bacteria's proficiency in metabolizing our stockpiles of surplus and unwanted matter. Eventually, whatever we stash underground comes into contact with the bacterial life that dwells in the soil, or rather, given a populace of some 40 million per gram, we might say *is* the soil (Clark and Hird 2014). Bacteria do what they have been doing since the Eoarchean: they figure out ways of metabolizing whatever matter-energy they encounter. Each landfill is, in its own way, a unique bundle of materials, at once an ancient and a novel opportunity for bacterial communities.

What bacteria do with the substances to which we expose them, or what this exposure does to bacterial populations, may have profound consequences for humans and other organisms. In an age of accelerating anthropogenic destratification, bacteria catch the fallout of our local and globalised transformations of earth systems, but we *are* the fallout of the dynamics of bacterial becomings. We are the incidental inheritors of ancient bacterial symbioses and the recipients of the gifts of ceaseless microbial metabolism. Whereas Latour permits other actants to compose worlds of their own (Latour 1993), the point about bacteria is their capacity to compose worlds for others (Hird 2009a; Clark and Hird 2014), and by the same logic, their ability to withdraw or undermine the vital support that they provide for all other forms of life, necessitating what I have called an ethic of vulnerability (Hird 2009a, 2010a, 2012b, 2013b).

Field Note: Margulis Laboratory – 19 Mar 2008

Lynn burst into the lab again, and headed for my workbench: was she going to test me on the difference between cyanobacteria and proteobacteria again? But today she's got Emily Dickinson on her mind, and launches into the recitation of a Dickinson (1924) poem:

> I felt a cleavage in my mind.
> As if my brain had split;
> I tried to match it, seam by seam,
> But could not make them fit.
> The thought behind I strove to join
> Unto the thought before,
> But sequence ravelled out of reach
> Like balls upon the floor.

I could not have put the research process better.

Modest Witnessing

An important part of the heated debate that took place between Robert Hooke and Thomas Hobbes over the invention of the air pump vacuum in the 17th century concerned modest witnessing (see Hird 2011). Whereas Boyle's modest witness is detached, witnessing from afar, un-engaging and un-engaged, Haraway (1997) and van Wyck's (2010) witnessing have something else in mind. Like Haraway, I inhabit the stories of (amongst others) a scientific revolution that attended the Enlightenment's promise of social justice-to-come. Through my research, I try to foster alliances with inhuman entities, aiming less at the creation of strong actants, and more to a recognition of our discrete, moderate, and uncertain place in the world: "valid witness," writes Haraway, "depends not only on modesty but also on nurturing and acknowledging alliances with a lively array of others, who are like and unlike, human and not, inside and outside what have been the defended boundaries of hegemonic selves and powerful places" (1997, 269; see also Hird 2004b, 2009b).

Which brings me, brings us all eventually (given time), to the question van Wyck asked as he travelled the *Highway of the Atom*: What kind of pedagogy does material engagement demand? A pedagogy of situated knowledges born of our (claimed or unclaimed) inherited pasts, of engagement, interest, and becoming as response-ability: of modest witnessing.

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Chapter 13
Queer Disability, Postcolonial Feminism and the Monsters of Evolution

Donna McCormack

> I [use] the term 'hopeful monster' to express the idea that mutants producing monstrosities may have played a considerable role in macroevolution. A monstrosity appearing in a single genetic step might permit the occupation of a new environmental niche and thus produce a new type in one step. (Goldschmidt 1940, 390)
>
> Monsters signify not the oppositional other safely fenced off within its own boundaries, but the otherness of possible worlds, or possible versions of ourselves, not yet realised. (Shildrick 2002, 129)

Evolutionary Difference and its Monsters

Charles Darwin's theories of evolution have been shown to be central to colonial discourse, policies and violence. Feminist postcolonial scholars detail how evolutionary theory is interpreted through a lens of progress that is constitutive of the systematic hierarchisation of species and intra-species relationality. As such, this narrative of evolution is revealed to be the structuring paradigm through which colonial authorities and institutions surveilled, subjugated and controlled individuals and populations. Here, evolutionary theory portrays a ladder of progression from animal through to human with the white, heterosexual and Christian *man* at the top of this chain. Therefore, most significant to colonial technologies is not, for example, the human's relatedness to or intimacy with the animal. Rather, what feminist postcolonial scholars show is that Darwin's work consolidated—gave the epistemological ground to—the idea that not all humans are as evolved as others (Stoler 2000, 39). Evolutionary theory became a biological technology that

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_13

facilitated and justified the violent segregation of populations according to purported scientific taxonomies of difference (McClintock 1995, 38). It came to be understood as a narrative of the survival of the fittest, where superiority is equated with white, able-bodied heterosexuality. In this binary thinking of species survival and the imagined fittest populations, inferiority is racialised as biological, animalistic and negatively different.

Because of evolutionary theory's constitutive role in colonial technologies of violence, it is largely considered to be at odds with feminist, queer, disability and critical race studies. However, similar to Elizabeth Grosz and Myra J. Hird, I want to suggest that a (re)turn to foundational texts in evolutionary theory is essential to re-evaluate their significance to our contemporary thinking on relationality and difference (and of course on evolution itself). More specifically, I would argue that the proliferation of representations of evolution in contemporary visual and literary culture necessitates our critical attention. In addition, I hope to show that by turning our attention to such representations we may also revitalise our feminist thinkings.

In this piece, I explore Richard Goldschmidt's theory of the hopeful monster as a resounding presence in contemporary visual and literary texts. Goldschmidt was a supporter of Darwin's theories of slow and continuous evolutionary change. However, in his 1940 book *The Material Basis of Evolution*, he insisted that macromutation was possible. Through this subsequently ridiculed theory of hopeful monsters (although one might argue that it is currently making a comeback in epigenetics and that the re-emergence of evolutionary theory in popular arenas is tied to these scientific developments), he claimed to prove that he had witnessed macromutation in nature. Here, macromutation signifies large typological changes that occur within one generation. Put simply, it is the creation of a sub-species or a new species within one generation (which is impossible, according to neo-Darwinism). In contemporary literary and visual texts, macromutation makes manifest an anxiety, but also an exciting potentiality, about the human's inter- and intra-relational existence with plant, animal, inanimate and technological life. In other words, in these texts, subsequent generations of humans are born with wings or other supposedly non/human features or capacities, and these representations thereby invite a reflection on what difference means for relationality across and within species.[1]

By focusing on Goldschmidt's work, I am building on Hird's suggestion that "evolutionary theory […] speaks directly to the foundations of social theory" (2009, 76) and that "competing claims within evolutionary theory […] point toward potentially alternate accounts of the origins of sociable life" (2009, 59). I am proposing that Goldschmidt offers a way into thinking difference as central to the (re)production of species. Goldschmidt simultaneously placed the monster at the centre of evolutionary doom and as the key to evolutionary survival. He insisted most monstrous beings would die. However, he argued that some were

[1]I use the form "non/human" for the reasons explained by Giffney and Hird (2008).

examples of environmental adaptation, of the inter- and intra-relationality of genes, species and environments.

Queer, disability and feminist scholars have often focused on the figure of the monster, analysing how embodied difference comes to signify inferiority in opposition to the imagined superiority of the "rational, autonomous, masculine subject" (Shildrick 2002, 121). As Margrit Shildrick and Rosi Braidotti show the monstrous body is a transhistorical phenomenon that demonstrates changing meanings of difference as it concerns the axes of gender, race, ability and sexuality, as well as the broader categories of the non/human, the animal, the degenerate and the (exotic/repulsive/appealing) foreigner. Braidotti states that "the stakes in the theory of monstrosity are the questions of reproduction, of origins" (2011, 234). She also touches briefly on how the attempts in teratology "to understand the genesis of monstrous beings [took place] in the light of evolutionary theory" (2011, 239). Braidotti thereby hints at an intimate tie between evolution, narratives of origins and monsters. My aim in this article is therefore to develop this connection between theories of the monster and current feminist, queer and posthumanist engagements with various strands of evolutionary theory. Building on feminist, queer and crip approaches to monstrosity, I argue that difference in the form of hopeful monsters is not a threat or an exception, as it might be for a Hegelian notion of the human or for medical and colonial normative bodily forms. Goldschmidt's theory challenges what Shildrick calls the "normative mind-set" that insists "the monstrous must always remain the exception" (2002, 117). Instead, it insists that difference drives evolution, opening up the possibility of continued life in its many unknown variations.

By bringing that which is different, changing and monstrous to the centre of evolution, Goldschmidt created what I would argue is a rather queer theory. He posited reproduction not necessarily as the creation of the self-same (a desire to replicate one's self), but instead as a constant production of unpredictable difference. Darwin imagined change as slow and continuous, and thus the temporality of evolution is interpreted as linear and progressive (where progression signifies improvement). However, for Goldschmidt, change is unpredictable; it may be slow and continuous, but it may also be short and rapid. Fast leaps of change where new (sub-)species are born suggest a temporality where origins cannot be imagined as a pure development of a single species perfecting itself throughout the generations. Rather, one could argue that this is a monstrous temporality where new (sub-)species are born and die at sporadic moments, changing what a species looks like, how it acts and/or to whom it may be related. Such dramatic shifts in typology demand that we ask whether the reproduced and yet very different species is related to the previous generation or whether it is indeed a new (sub-) species. Following Donna Haraway's exploration of companion species and promising monsters, this piece argues that in bringing Goldschmidt to the fore of evolutionary thinking our understanding of relationality, differentiation and (genealogical) temporality is precisely what is at stake (Haraway 2007, 19).

My focus here is primarily a short story entitled "Hopeful Monsters", written by Hiromi Goto, and taken from her collection of short stories also called *Hopeful*

Monsters (2004). However, central to my argument is what I would call a surge in the popular production of cultural texts that deal with evolution, including, for example, *Orphan Black* (2013–2015), *Heroes* (2006–2010), the *X-Men* film series (2000–2014), *Sense8* (2015) and *Fringe* (2008–2013). Thus, while my analysis focuses mainly on one short story, my larger argument points to the contribution that critical feminist, queer, crip and postcolonial thinking may offer to an analysis of the emergence of evolution in contemporary cultural representations. In arguing that this short story captures the problematics of evolutionary theory in contemporary literary and visual texts, I am reaching beyond the story itself to the many ways in which it articulates current cultural thinking on narratives of origins. All these texts engage with the consequences of macromutation, of a monstrous change that produces a species connected to and yet different from the previous generation. They make manifest the ontological anxieties of facing (our) monsters, and thus the environmental and socio-political ethics, consequences and potentialities of being of, with and next to difference.

Feminist and Postcolonial Evolution

Evolutionary narratives are foundational to our understandings of life, its origins and its continued persistence. I therefore agree with Grosz's suggestion that evolutionary theory should not simply be abandoned by feminism. Therefore, building on Grosz's work on Darwinism and the queer ideas of Hird, I turn to evolutionary theory to explore the fascination in contemporary culture with monstrous bodies, medical technologies, and the production and regulation of difference. For Grosz, Darwin's theories of evolution stress "difference, divergence, bifurcation, and division" (2008, 46 n. 1). More specifically, she states: "His work develops an anti-humanist […] understanding of biological dynamics that refuses to assume that the temporal movement forward can be equated with development or progress" (2008, 28). Similarly, Stacy Alaimo insists that an "openness to material agencies, including those of evolutionary forces, entails an openness not only to the deviants that result but also to the wider sense that the world is ever-emergent" (Alaimo 2010, 143). Evolution, here, is not about improvement, betterment or (any connotation of) progress. Rather, the emphasis is on a constant multiplication of difference as integral to the ever-changing nature of all species. A feminist and queer (re)turn to evolutionary theory is an attempt to interrogate an imagined sociality of nature where reproductive sameness is hierarchical and therefore where difference is always considered inferior to an imagined "better" state. This evolutionary imaginary is a necropolitical practice insofar as the so-called inferior are imagined as dying naturally from biological weakness, but where in actual fact institutional technologies enforce such deadly political actions. To address the meaning of difference, relationality, reproduction and genealogy in the works of Darwin, Goldschmidt and others opens up the possibility of thinking sociable life and death differently.

My turn to the idea of the hopeful monster is a queer orientation towards a ridiculed theory that nevertheless saw monsters as our only hope. It is an exploration of how the monster, central to crip, feminist, race and queer thinking, is integral to evolutionary thought. Informed by queer methods of veering off the well-trodden path (Ahmed 2006, 12–21), I am moving away from prominent neo-Darwinian interpretations of evolution not to deny their significance, but rather to explore what socio-political imaginaries emerge through other theories of evolution. I am focusing on the scientific context of the monster to tease out its ignored or unacknowledged centrality to foundational narratives. As both Shildrick and Braidotti insist, the monster, even when repulsive, appeals to us, compelling interpretation but ultimately defying "explanatory closure" (Shildrick 2002, 41). Building on these feminist traditions, I am (re)turning to a monstrous evolutionary theory to see what wonders are raised in everyday representations of rapid generational change. It is monstrous both in its explicit engagement with the idea of the hopeful monster, a somewhat unacknowledged precursor to the promising monster that is integral to the work of many feminist thinkers (Haraway 1992), and in how it has been ridiculed within the scientific community, becoming an outsider to the dominant mode of doing evolution (namely neo-Darwinism).

The theory of hopeful monsters changes how we understand the speed at which change can occur, imagining it as a rapid process. Therefore, in contemporary culture, macromutation opens up a discussion about the exceptionality of the human, asking: Is there really anything unique about the human? Is the human still human if it has wings or a tail, is telepathic or telekinetic, or can walk through walls and travel through space and time? And how do we understand and relate to difference, in its infinite forms? Fictional texts raise questions regarding how a species is related to the previous and yet different generation, and what such newness means for relationality through difference. Furthermore, this immediate sense of intergenerational difference brings to the fore that the monstrous is already of the self, ontologically integral to the human, and thus reproducible as non/human. Turning to marginalised scientific accounts of the origins of life is an attempt to grapple with the rejected monsters that are integral to thinking the non/human's existence.

Evolutionary Tails and Queer Non/Humans

As is apparent from the title of both her book and short story, Goto engages directly with the science of Goldschmidt's hopeful monsters. Furthermore, "Hopeful Monsters" opens with a quotation from the evolutionary biologist Stephen Jay Gould speaking about Goldschmidt's work:

> Goldschmidt did not object to general microevolutionary principles, however, he veered from the synthetic theory in his belief that a new species develops suddenly through discontinuous variation, or macromutation. […] Goldschmidt believed that a small percentage of macromutations could, with chance and luck, equip an organism with radically

> beneficial adaptive traits with which to survive and prosper. These he called 'hopeful monsters'…. (Goto 2004, 135)[2]

Such a framing of the as yet untold story evokes a scientific theory of monstrosity, where monsters demonstrate that difference and change are essential to life in a shifting environment. Along with many of the aforementioned visual texts, especially the *X-Men* film series and the television show *Heroes*, this short story uses the idea of evolutionary monstrosity to think through the socio-political problematic of embodied difference as the impetus for violence towards others.

"Hopeful Monsters" takes place in contemporary Canada and tells a tale of a Japanese-Canadian woman, Hisa, giving birth to her first child. Similar to *X-Men* and *Heroes*, "Hopeful Monsters" uses Goldschmidt's theory of a sudden evolutionary leap to capture how the human comes (perhaps too) close to the non/human or the animal as to require external management and surveillance. The text echoes Shildrick's thinking on monstrosity insofar as she insists that it "is the *unmodified* body which is seen as unnatural, in need of 'corrective' interventions" (2002, 55). Goto's story emphasises that the baby with a tail is born to two people who believe themselves to be rather normal heterosexuals. Hisa's mother eventually reveals that Hisa and her dead siblings were all born with tails. Goto creates a tension between the normative demands of medicine, Hisa's experience and the untold histories of genetic difference. The medical professionals want to surgically remove that which they term as a mere caudal appendage, but Hisa soon realises that this is a tail that feels and moves. The short story makes apparent one mother's struggle regarding whether her child's monstrous body should be surgically altered to facilitate what is imagined as a normal life or whether difference is a problem because medical practice is steeped in racist and able-ist practices and histories. The baby comes to embody Goldschmidt's idea of the hopeful monster in being the potential for the human to develop differently, or indeed for a new species to emerge. Hisa must decide whether to let her daughter undergo surgery or whether to enact other, less predictable, and what Goldschmidt termed hopeful, possibilities.

While the title of Goto's collection of short stories already evokes a scientific context for and a feminist tradition of monsters, the content is also concerned with bodies that exceed the order of the normative subject. These bodies ooze fatness, liquids and much more. Indeed, Hisa's pregnant body, in its more-than-oneness, in being an organism that is both self and other, could be described as "morphologically dubious" (Braidotti 2011, 226), "a cultural taboo" (Tyler 2001, 69) and evoking a "disruption of the corporeal limits that supposedly mark out the human" (Shildrick 2002, 29). The story itself describes how Hisa "could see her skin give, as if an alien was trying to burst out of her belly" (Goto 2004, 138), portraying a connection between the monstrous bodies of the film series *Alien* and Hisa's own out of control and potentially repulsive body (if the normative body is clean and

[2]The quotation is referenced in the acknowledgements as from Gould (1977).

sealed).[3] On the one hand, this baby/mother body is presented as monstrous because the purported separation that founds the human subject is undone. On the other hand, her body emerges as monstrous through a process of racialisation. Sensitive to the reactions of the medical professionals and her partner as her daughter is born, Hisa asks:

> 'What's wrong with it?' […] 'Does it have really slanted eyes?' […] 'No!' Hisa hissed. 'Not slanted like mine!' […] 'The other kind of slanted,' Hisa gritted. 'The retarded kind.' (Goto 2004, 146)

Disability and race are interwoven through a somatic register of difference, where eye shape signifies racial and/or intellectual inferiority. Histories of race and disability merge in a supposedly euphoric moment of birth to lay bare anxieties about the reproduction of embodied difference as a signifier of inferiority. In many ways "Hopeful Monsters" evokes a history of the maternal monstrous imagination, whereby the mother is believed to influence foetal development through her thoughts and actions (Shildrick 2002, 33–44; Braidotti 2011, 228–235). However, the story links historical transmissions of monstrosity to a conflation of racialised difference with cognitive disability. Similar to the *X-Men* film series, an evolutionary theory of monstrous difference is mapped onto racialised ability to expose how difference is interpreted as a socio-political problem.

Yet, this is a fantasy narrative that destabilises, rethinks and sometimes simply pokes fun at the continued colonial imaginary of contemporary Canada. Indeed, in the above quotation, Hisa's questions mock the multicultural nation's celebration of diversity by bringing together histories of imagined inclusion with continued practices of exclusion based on bodily differences. Hisa's words reveal a tension between the multicultural politics of the Canadian nation and the possible socio-political consequences of living with difference. A tail is too queer to be absorbed into or celebrated by the multicultural nation, and therefore medical carers implement a normative (re)production of national bodies of sameness.

In the *X-Men* film series, the scientific and medical professionals simultaneously produce innovative research and create means through which whole populations may be exterminated. Indeed, in *X-Men: The Last Stand*, the scientists find a *cure* for the mutants that is both the promise of assimilation and the destruction of difference. In "Hopeful Monsters", Goto critiques the medical professionals' approach to difference, as well as their imperative to *cure*. Here, professional care for an other is inseparable from the surgical interventions used to manage and erase difference. On the one hand, the short story suggests that violence towards others is firmly grounded in a familiar process of dehumanisation whereby difference signifies inferiority and therefore is used to justify abusive interventions. On the other hand, where race and disability have often been figured as two distinct operative categories, "Hopeful Monsters" portrays how the proximity of the human to the non/human or the animal in a so-called liberal society does not

[3]See Shildrick (2002) on the clean and proper body.

provoke an *openly* racist, segregationist and able-ist prejudice, as we see in *X-Men*. Instead, what is apparent is that medical care, which claims to produce a child who can integrate into society, involves harm, and relies on and produces normative bodily forms. We witness a tension whereby Hisa cannot hide her visible, racialised and often fetishised differences, and the medical professionals' promise that the baby's "caudal appendage" (Goto 2004, 148) "can be rectified with a small surgical procedure" (2004, 146). Monstrosity is fleshed out with able-ist and racist dimensions. In other words, if racial diversity is essential to the multicultural nation, morphological difference both exposes the limit of such acceptance and reveals a proximity to the non/human or the animal that must be eliminated. The multicultural nation needs Hisa, but her child with a tail is in excess of diversity's needs and therefore medicine offers a "corrective" solution. The medical arena manages human potentiality, restricting its development in its multiple and unpredictable dimensions.

Histories of Evolution, or Silenced Memories

Goto's short story evokes histories of difference, where monstrous bodies were (and continue to be) displayed in awe, disgust, wonder and repulsion. I would suggest that Hisa's daughter's tail is a physical manifestation of—as well as a linguistic play on—a *tale* of evolution that must be narrated. Goto's story shows how institutional interventions emerge through a securing of the category of the human as separate from the animal (where the tail is understood as a non/human or animal phenomenon). The representation of the baby with a tail is a distancing of that which is of the human from that which is a "freak of nature that was wrong, wrong, wrong!" (Goto 2004, 153). Racial categorisation and morphological difference collide in this image of what Rosemarie Garland-Thomson (1996) terms "freakery," where the spectacle of difference shows Hisa's (and the medical professionals') "skin-crawling repulsion" (Goto 2004, 153). Morphological diversity cannot thrive in contemporary Canada where benevolent and caring professionals offer the promise of a baby like everyone else's who will surely integrate into the world of morphological and national sameness. Histories of racial, disability and colonial violence are overlaid in a tail that is supposedly devoid of affective and motive capacities, and therefore is a difference that is expendable. As the doctor says, "It looks like a tail, but it's not. A caudal appendage is mostly skin and either fatty substance or gristle-like material" (Goto 2004, 149). Here, evolution is producing endless difference and promises monstrous developments, but medical professionals refuse to let the embodied category of the human change or be different.

While Goldschmidt's theory of hopeful monsters does not offer the radical potential of rethinking genealogy as a horizontal process, in the way Sarah Franklin describes (2000, 217–219), it does offer a sense of time and interrelationality that differs from prominent interpretations of Darwin's texts. It suggests that sudden change can happen and in so doing makes apparent an already existing

relationality between animal and human species and their environments. Goldschmidt's narrative tells of a sociality where difference is essential to survival and, like Haraway's promising monsters (1992), bears witness to the human as an intra- and interrelational being. When Hisa's distressed mother learns of her granddaughter's tail, she begins to articulate the unspoken: the story of Hisa's own tail that was removed when she was a baby. Goto opens up the possibility of the queerly human, the non/human and a human/animal hybrid. Hisa's mother awakens memories of what Hisa cannot quite remember, but knows she has been missing all her life. Connecting her previously unknown tale to a history of disability, Hisa describes herself as feeling like "an amputee" (Goto 2004, 160). She asks, "How many amputated tailless people were out there…?" (2004, 161). Her feelings of loss, of being connected to possible others through bodily amputation, express a yearning for what may have been, for what might be or even for another tale. This sense of a queer time (Dinshaw et al. 2007), which connects Hisa to an unknown past, intersects with the temporality of macromutation. It is as if new knowledge emerges through the tail in the form of her mother's tale. In other words, the attempt to remember what it felt like to have a tail is a re-imagining of her body, her history and her life with her daughter. Time is condensed, creating a queer effect of living simultaneously in the past and the present, and thereby imagining the possibility of different futures.

The story further rubs up against the queer when Hisa contacts the lesbian couple from the antenatal classes to see if they, in their experience of knowing what "it's like not to be normal" (Goto 2004, 166), may be able to help her flee the hospital and her partner. That Hisa assumes a commonality between lesbians and babies with tails not only adds a further layer of humour to the story, but also indicates how tenuous the survival of this non/human species could be. The consequences and potentialities of what it means to "never be treated like a normal child" (Goto 2004, 166) are no longer the responsibility of medics but instead are the means through which a humorous and unpredictable alliance is made. If Goldschmidt referred to environmental survival when speaking of hopeful monsters, Goto's emphasis is on socio-political potentialities. That is, if embodied difference may result in ostracisation, segregation and subjugation, then evolutionary narratives offer the potential to rethink what it means to live with others, with difference and with (our) monsters. They also suggest a coming together across and through difference, even where these alliances are somewhat temporary and uncertain.

Goldschmidt saw hope in monsters. Nature, biology and hope were all unpredictable, and yet promises of difference and new lives. Goto does something similar with her hopeful monster: biologically different and yet related to the human, Hisa's daughter promises hope for those different from the dominant medicalised definitions of the human. She may be of a species that is an earlier or superior version of the human, or one that is from a so-called non/human taxonomy, but perhaps more accurately she is of both and more. She is born of people who pass as human, further suggesting that the ontology of humanness is itself a biological taxonomy from which many of us deviate regardless of whether the differences are visible or not. Or perhaps more queerly, Hisa and her daughter

manifest the non/human in its multiple different and evolving forms, in its constant becomings. The queer promise of hope is that difference might thrive, as Goldschmidt insisted was necessary for evolutionary survival, or it might be curtailed as uncertain alliances face the everyday assault on difference. At least for Goto, Goldschmidt holds out the scientific and socio-political hope that monstrous bodies circulate among and in us, form our very genetic beings, and demand that we speak queerly of what is yet to be told.

Evolutionary Monsters and Hopeful Potentialities

Macromutation is a typological change within one generation that occurs as a result of embryonic interactions with the environment. While neo-Darwinism, with its emphasis on slow and continuous change, is the foundation and central tenet of biology, macromutation is (re-)emerging as integral to epigenetics and evolutionary biology. Such alternative accounts of evolution permeate contemporary cultural texts and offer the potential to rethink narratives of origins, especially human-centred teleologies.

Goldschmidt's theory of the hopeful monster invites a reflection on the meaning of difference and pushes us to address the consequences and potentialities of living with, co-opting and destroying difference. Goldschmidt, like Shildrick, Braidotti, Franklin and Haraway, encourages us to place our hope in monsters.[4] To this extent, as much feminist, postcolonial, crip and queer theory suggests, monsters are not aberrations of which society, and medicine in particular, can neatly dispose. Rather, monsters are integral to the production of the normative subject. However, what Goldschmidt's theory also demonstrates is that nature's monsters, while not the guarantee of life, are the embodiment of the intra- and interrelationality of the non/human and its environments. Here, the monster and the human are intertwined, and they expose the limits of society's desire for difference, as well as the potential for new species development.

While my focus has been one short story by Goto, many literary texts, popular films and television shows tackle a normative and dominant discursive desire for morphological and typological sameness through alternative theories of evolution that are indebted to and/or resonate with Goldschmidt's work. Goldschmidt's hopeful monster suggests something a little queer where there is not a creation of the self-same but rather a constant, unpredictable difference. The *X-Men* film series, the television series *Heroes* and Hiromi Goto's *Hopeful Monsters* portray the human as of the animal and/or the environment, and therefore as uncertainly human. On the one hand, the texts appeal to a more expansive category of the human that is able to incorporate humans that differ from a standardised definition.

[4]In Shildrick's words: "I read the monstrous, along with Haraway and Derrida, as hopeful, the potential site of both a reconceived ontology, and a new form of ethics" (2002, 131).

On the other hand, they put into question the very category itself, suggesting the human is always already non/human. What a turn to the hopeful monster offers to our feminist, crip, postcolonial and queer thinking of embodiment and the production of hierarchical distinctions is that narratives of origins may challenge the exceptionality of the human. To this extent, evolutionary theory may bring to light and question the processes through which differentiation occurs to segregate and subjugate others and to render life unliveable for whole populations. Feminism, queer, disability and postcolonial critical readings of evolution allow us to think through alternative ways of theorising difference, relationality and (genealogical) temporality. By reading the scientific notion of hopeful monsters through theories of the monster, we see evolutionary time as moving at varying rates, the potential for new species within one generation, and humanness as an intra- and interrelationality of the animal, the environment and the monstrous.

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Chapter 14
Re/membering the Body

Margrit Shildrick

In this chapter, I will trace the development and implications of some theoretical strategies of re/membering the body as they have arisen over the last 25 years or so. Feminist thinking has been central in shaping the wealth of complex body theory that has emerged, but it has never been a straightforward case of a reinvigorated feminist movement forcing the agenda. For some time after the initial emergence of second wave feminism in the 1970s, there was—apart from an ongoing focus on reproductive issues—what could only be termed in retrospect a form of somatophobia generated by the fear that bodily matters were a potential point of ambush by hostile commentators (Kirby 1991; Grosz 1994). In the subsequent reinstatement of the corporeal, however, all the conventional tropes of modernism that have both insisted on a conceptual split between mind and body, and recognised only one form of "proper" embodiment, have been critiqued in the light of postmodernist—and more recently posthumanist—modes of thought. The turn away from the rigid binaries and categories characteristic of conventional and still dominant ways of thinking—whether in the humanities or sciences—has mobilised not simply the emergence of a feminist phenomenology of embodiment, but a growing appreciation of the place of the sciences in understanding the materiality of the body. At the same time, the extension of multiple challenging bioscientific technologies directed to the body and its practices indicates that the recovery of fleshiness as such is not a final step. While the concept of the leaky body (Shildrick 1997; Longhurst 2000) is now well-established, the stress on that instability and fluidity as the catalyst for more productive ways of thinking about human corporeality and embodied subjectivity has moved on in contemporary feminist scholarship to encompass a reconsideration of what it means to be human. I would argue strongly that as the boundaries of the body itself are ever more

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_14

contested in both theory and empirical practice, it becomes clearer that the resulting sense of exposure to otherness in all its forms, and the inherent vulnerability of the contingent self, necessitate a new configuration of bioethics. It is one in which the encounter with otherness—such as those unlike myself in terms of morphology or putative origin; prosthetic supplementarity; or the intracorporeality of the microbiome—speaks to a corporeal ethics that understands risk and vulnerability as the very possibility of becoming.

The genealogy of second wave feminism relates back in large part to the modernist split between the immanence of the material body and the potential transcendence of the immaterial mind, and to the gendered association of the female body with uncontrollable biological processes and passions and the male mind with self-control and rational abstract thought (Lloyd 1984). That entrenched scenario ensured that although feminism of the early second wave privileged a materialist analysis of social and economic conditions, it rarely spoke to the body as such except in very specific conditions. Certainly the significance of women's unique relation to the nexus of reproduction was given renewed attention as the focus of both oppression and potential power, but with an attendant unease that it might invite accusations of biological essentialism. Even work as radical as that of Luce Irigaray (1985a, 1985b) attracted controversy related to a wariness of essentialism. It seems strange now to imagine an exclusionary theoretical choice between body and mind, but it was certainly the case that phenomenology had little traction until Iris Marion Young (1990) began her explorations, and in a similar way science-based epistemologies, and occasionally ontologies, were relegated to a minor role. Any genealogical summary risks over-simplification, of course, but for several years, feminists such as Donna Haraway (1989) and Anne Fausto-Sterling (1992)—trained in and drawing on the biological sciences—were isolated voices whose insights gained wider traction only with the relatively late emergence of feminist science studies.

In such a context the association with poststructuralism with its emphasis on representation and the discursive nature of everyday "reality" provided a way of understanding the construction of knowledge around the feminine whilst at the same time indulging abstract theory at its most challenging level. It produced in effect a cloistered space of reflection where critique was an end in itself. Like many other feminist theorists, I have found that step away from substantive issues both liberatory in its promotion of thinking as an activity of high value, and stultifying in its exclusion of lived experience. What is noticeable is how quickly the purist model of poststructuralism—exemplified best in early Spivak (1976, 1987) and Butler (1990)—proved inadequate to specifically feminist scholarship. It is not, of course, that it was ever superseded as such, but that its limitations were addressed by a growing engagement with the material, with multiple locations, and with a productive intersection of several diverse theoretical approaches. The new amalgam is often named postmodernist, but I much prefer the term postconventional which more clearly acknowledges that creative challenges and the promotion of contestational perspectives are not simply the invention of the late twentieth century. Amongst the major markers associated with the postconventional is a re/membering

of the body, not as the unchanging biological substrate of individual selfhood, but as a phenomenological rendering of lived experience. To say that a body—any body, human or otherwise—is materialized in its discursive (re)presentation is not to diminish its reality as matter in the world. Although the authority and foundational certainties of the real in the guise of an originary truth must always be contested, corporeality emerges in multiple ways. Rather than being simply a surface of inscription that can be read as a text, the body in contemporary feminist inquiry shifts its parameters to encompass the anatomical, social and discursive bodies as mutually constitutive. Those figurations are never exclusive but remain fragmentary in themselves, having little meaning when isolated from one another. At the same time, the viscerality of corporeality is matched by affect, expression and emotion as the substantive markers of what it is to be embodied. The flesh and blood givenness of the physical body is not then a passive surface, but the site of sensation, desire and experience which are in continuous interaction with discursive practices. There is, in other words, an ongoing dynamic process of production at the interface of biology, affect and language.

That should not be taken to imply, however, that the conjunction of such elements finally delivers an enduring understanding of the body. Rather the body in process is always less than complete, always anomalous with respect to the normative expectations of embodiment, and more importantly always dependent on other bodies rather than autonomous. Not only is its stability compromised by its own fluidity and leakiness (Shildrick 1997), but it is emergent—becoming—within the context of similarly unstable forms. In the phenomenology of Merleau-Ponty (1962, 1968) from which many feminist theorists have taken their starting point in re/membering the body, the corporeal forms in question have been ostensibly limited to the human alone. What has mattered most is Merleau-Ponty's insistence that neither mind nor body, self nor other, have any independent existence and that what we understand as subjectivity emerges from the interaction that constitutes embodiment. As such, the clear implication is that being-in-the-world is never settled but open always to transformation. As the body itself responds to and is altered by its interactions with others and with the substance of the world, so the self is simultaneously and inevitably changed. If I lose a limb, or acquire a bioprosthesis, I am not the same person as before, just as my intention to run a marathon or my becoming pregnant will, I anticipate, transform my body shape and my sense of who I am. What might be called the matter of living-in-the-world-in-our-bodies belies the closure of the subject, and relies instead on multiple, but separate and discrete corporealities forming a tissue of intercorporeality in which each body is open to and affected by the others. Accordingly, our lived experience with others is the basis of our being (or becoming)-in-the-world at all, and the autonomy and sovereignty of the subject are continually undone, even as they are enacted, by intercorporeal encounters (Shildrick 2002). It is not a question of dependency nor yet of incorporation, neither passivity nor consumption in the face of otherness, but of profound connection that enables the emergence of provisional selves.

What is not clear in Merleau-Ponty's terms, however, is how far the significant actors are necessarily human beings. In his posthumously published draft work

The Visible and the Invisible (1968), he introduces the notion of "the flesh of the world" which seems to open up to other horizons than the broadly humanist concerns of his earlier works. The flesh of the world is an intriguing term which implies both the viscerality of our environment—we are of it rather than in it—and the fundamental unity of existence. When Merleau-Ponty asserts that I must rely on "other landscapes besides my own" (1968, 141), those different perspectives/experiences are nonetheless interwoven with mine through the reversibility of seer and seen, subject and object. I understand the flesh of the world as the elemental medium, the undecidable environment, in which we are all immersed, the site of the encounter between self and other, and by which we are profoundly touched, indeed constituted as selves at all. To use the terms self and other no longer refers to the binary distinction of the humanist model; instead that is precisely what is thrown into question. Rather than the interval of separation that holds apart and maintains the illusion of discrete beings, the model proposes that we experience distance through proximity, a folding over of flesh that creates the possibility of difference within a unified but undifferentiated medium. As Sue Cataldi puts it, the concept of flesh enables us to "think through embodiment beneath subject-object dualism by developing a radically unified ontology" (1993, 58). What Merleau-Ponty is attempting to do is to express a non-dualistic existence that is centred not on a knowing and sovereign subject, but rather on a coming together in difference, a point of both convergence and divergence. More importantly, he is arguably going beyond reference to human-to-human interaction, for if intercorporeality in the phenomenological mode engages with multiple differences, then there is no reason that its application should be limited to the intermeshing of human beings. The concept of flesh ontology clearly implies something in excess of the human to human interconnection that channels the co-construction of embodiment.

The force of posthumanism indicated in phenomenology is not yet a full embrace of the posthuman, which requires I think more specificity than Merleau-Ponty can provide. Although the widespread take up of his work (Weiss 1999; Diprose 2002; Zeiler 2010) puts embodiment firmly in the forefront of feminist theory, and raises questions about the parameters of human being by destabilising its boundaries, it does not radically rethink what is meant by the category itself. Moreover, for all that it remembers the body, phenomenology remains thinkable in a fairly abstract context. It took feminist scholarship, after all, to insist that bodies are always sexed (Young 1990), that they are the locus of multiple material and substantive differences like age, disability, race, sexual practice and health. I shall move on therefore to consider some of the specific issues that have demanded of feminist theory a rapprochement with the concept of the posthuman, and it is here that the intersection with science becomes critical. I do not want to claim that the developments in techno- and bioscience in the age of postmodernity, our own age, are the only reason that theory has shifted its attention to the posthuman—the theoretical tools have long been available—but that they have given impetus to the urgent need to rethink the parameters of embodiment. Recent years have seen an explosion of new technologies that intervene in corporeality and directly challenge the notion of the embodied self as a relatively stable and

bounded entity that could be reliably identified as singular and enduring. This goes much further than the leakiness alluded to earlier and speaks not only to a profound disordering of its component parts but to its recomposition in startling new configurations. I am thinking of a whole range of effects—both high and low tech—such as transplant and implant surgeries, the use of prostheses both biomedically and cosmetically, the sequencing of the genome of many diverse species, microchimerism at the cellular level, personal communications devices, the microbiome project, and our reliance on a range of pharmaceuticals derived from other animals and from plants. The possible list of significant realignments grows daily, impinging not only on embodied selves in extraordinary circumstances but on all of us in our everyday lives. From a phenomenologically informed view—and the relevance of that jump-off point remains—it is clear that such a dynamic inevitably must compel us to rethink the nexus of the human both now and historically. Feminist body theorists are involved at every level of inquiry, engaging with the technologies themselves, monitoring the production of knowledge in a range of authoritative contexts such as bioscience, and thinking through the implications: asking are we more than or less than human after all, and what kind of ethics might make sense of our radically decentred position.

Consider, then, a couple of specific areas to help discern what is at stake: one relatively sophisticated in bioscientific terms, the other ranging from the highest of technologies to the everyday use of functional body modifications. The two areas—organ transplantation (both organic and mechanical) and the deployment of a range of prostheses in conditions of disability—are in fact closely related: both entail forms of supplementation, hybridity and assemblage. Indeed, just as Aristotle named corporeal excess, deficiency and displacement as the common indicators of monstrosity, it is those terms—supplementation, hybridity and assemblage—that might be taken as the privileged markers of the posthuman. And perhaps it is the very overlap of the two historically distinct categories—the monstrous and the posthuman—that begins to explain the widespread anxiety that the notion of the latter evokes.

Organ transplantation is a rapidly developing and still relatively new aspect of biomedicine with the first successful solid organ transplants occurring less than 50 years ago. The basic technique devolves on the removal from the body of a diseased or damaged organ and its replacement with either a substitute organ from another body or with a mechanical device that can successfully mimic the necessary functions that will prolong—often for many years—the life of the recipient. At present, in the vast majority of cases, any whole organ replacement is taken from another human being, though the prospect of xenotransplantation is never far behind. There has already been limited experimentation with pigs' hearts for example, but a combination of public revulsion and biomedical obstacles has, temporarily at least, meant that most clinical experimentation is from pigs to non-human primates (Ekser et al. 2009). Nonetheless although the transplantation of whole organs from animals to humans is usually banned, animal parts—such as pigs' heart valves (Singhal et al. 2013)—are commonly used as bioprostheses. Research in xenotransplantation is conducted, of course, entirely for the benefit of

human beings with the hope of eventually meeting the acute "shortage" of donor organs. There is much that is bioethically alarming about human to human transplantation (Ross et al. 2010) but nothing to match the reduction of living creatures to expendable organ banks. Experimental procedures typically entail the genetic modification of donor animals and provide a prime insight into the strict limitation of bioethical concerns to our own species. In that sense—and for all its dismantling of human/animal boundaries—the use of animal bioprostheses fails one test of the posthuman, but the very possibility does nevertheless raise serious questions about human ontology.

There appears to be no parallel controversy around the use of mechanical organs in heart transplantation, where models now in use—generally referred to as ventricular assist devices (VADs)—rely on an implant not much larger than an organic heart, connected to an external battery pack that can be easily carried around by the user. Foreseeable developments in miniaturisation and the use of wireless power sources are likely to make VADs more viable as destination rather than bridging therapy. In other words, instead of being a stop-gap treatment until an organic heart becomes available, VADs could be life-long implants for those with chronic heart failure. The mechanical solutions to other common forms of organ failure are far less sophisticated and crucially do not permit ambulatory use. Kidney patients may have to undergo hours of dialysis several times a week, while the options for mechanical lungs are even more limiting. The use of cardiopulmonary bypass devices such as extra-corporeal membrane oxygenation (ECMO) require prolonged and continuous attachment to an array of machinery, and currently their more functional usage is in prolonging the viability of lungs to be taken from a deceased donor. Regardless of the actual use of specific procedures, however, it is clear that there can be no sense of purity or singularity with regard to the human body. In extremis, life itself is dependent on prostheses, both organic and mechanical, which signal not only a fundamental hybridity, as in the conjoining of heterogenous parts to constitute a new whole, but a a *provisional* coming together of disparate elements that constitute a form of assemblage in the Deleuzian sense (Deleuze and Guattari 1987). None of this implies that assemblages are unusual or extraordinary and at the most basic biomedical level, one could cite multiple examples of interventions into human corporeality that are so widespread as to be taken for granted. Pacemakers, hearing aids, stents, braces and fillings for the teeth, cosmetic surgery, spectacles, hip replacements, dieting, and physiotherapy are all prosthetic materials or procedures. In conventional terms, prostheses are most clearly associated with various forms of—usually physical[1]—disability in which some addition to the body is made to replace a damaged part and where possible to restore at least partial functionality, yet they are no less components of assemblage. As with the heroic medicine of transplantation,

[1]The restriction of prostheses to physical states is breaking down as neuro-implants increasingly become an interventionary response to various cognitive and sensory disorders. Coincidentally, the first hand prosthesis that can 'feel' what it touches has recently been successfully tested (Raspopovic et al. 2014).

the body's own fleshiness is supplemented—in its fully ambiguous Derridean sense of substitution, augmentation and *différance* (see Shildrick 2013)—by prostheses which speak not simply to therapeutic repair or enhancement but to the unstable phenomenological, material and discursive nature of embodiment.

But once we understand embodiment to be a highly complex and fluid state, at odds with a psycho-social imaginary that privileges corporeal wholeness and integrity, then what is at stake in constructing a normative model is both the maintenance of an illusion, *and* the inevitable transformation of it. From a phenomenological perspective, it is clear that, whatever the intention, reliance on a prosthesis is not simply a matter of a self utilising an exterior and neutral technology in order to (re)create corporeal integrity, but of becoming embodied as hybrid. Any prosthesis, biomedical or otherwise, must profoundly unsettle the conventional binaries that mark out the clean and proper body of the psycho-social imaginary. In Linda Finlay's phenomenological account (2008) of a colleague's reaction to receiving a cochlear implant after 50 years of deafness, for example, that experience is described primarily in terms of alienation, of a profound disruption of the sense of self that had previously existed. Rather than feeling empowered by her new capacity, the recipient, Pat, experiences herself as more disabled by her inability to process her environment in a familiar way. What her prosthesis has enabled her to hear makes little sense in terms of her lived experience, her personal habitus. Just as happens with heart transplant patients for whom the reordering of their bodies and the realisation of hybridity is deeply disturbing to their sense of secure selfhood (Ross et al. 2010; Shildrick 2012), Pat's hybridity is also a disassembly of self. More telling yet, Finlay, as her friend, experiences her own perceptions of the world differently. As Pat asks about the identification of sounds on a walk in the woods, Finlay struggles to assimilate what she has not consciously heard before—a cacophony of background noise—and realises that her own becoming-in-the-world has changed. At very least her reactions point to the interdependency that we all experience.

Just as the emergence of a new assemblage associated with Pat's implant, pulls in her companion and underlines the web of connections, so too Rod Michalko's account of his relationship with his assistance dog exemplifies precisely how the mutually constitutive nature of their intercorporeality radically contests several entrenched conventions peculiar to the binary structure of modernist thought. He writes:

> Whatever Smokie and I do, whatever kind of life we experience together and whatever else we mean to each other, we are 'person and dog' sharing a life together…. Smokie's presence in my life has reminded me that 'nature' is as much a cultural construction as 'blindness' is, and that distinctions like human/animal, society/nature, nature/nurture are themselves human inventions. (1999, 9)

As before with organic transplantation, Michalko demonstrates that to think of prostheses—for that is surely what Smokie intends—in an inorganic register alone is too far limiting and anthropocentric. The very intimacy of man and dog belies the promotion of sovereignty, both *of* the human self and *over* the animal, and

speaks instead to an affirmative becoming-together that goes beyond their individually bounded bodies. Michalko's own phenomenological understanding of the intercorporeal connection swiftly shades into something even more challenging to the normative conventions of binary thinking, and perhaps we can say that the man is as much Smokie's prosthetic supplement as the other way round. To a Deleuzian, the intermeshed mode of life signals just that form of assemblage that circumvents the givenness of rigid subjectivity and opens on to productive new ways of becoming in the world. The process is highly reminiscent of Haraway's cyborg (1991), in making no stable distinctions between the organic and inorganic, between the natural and artificial, or ultimately between self and other. The difference as I see it is that the cyborg is more closely aligned to hybridity and does not signal quite the same sense of fluidity as an assemblage.

Assemblages are always non-necessary: contingent, unpredictable and decomposable, and as such they pose a problem for ethics. They are characterised by what DeLanda calls "relations of exteriority" (2006, *passim*), meaning that the component parts could be part of quite different assemblages, mobilising other materialities and meanings. In some instances, as Deleuze uses the term, assemblages may be composed entirely of bodies, but more often the parts are a diverse conglomeration of physical objects, happenings, events, together with signs, utterances, and so on:

> In assemblages you find states of things, bodies, various combinations of bodies, hodgepodges; but you also find utterances, modes of expression, and whole regimes of signs…. an assemblage is first and foremost what keeps very heterogeneous elements together: e.g. a sound, a gesture, a position, etc., both natural and artificial elements. (2007, 176–179)

It is this very indeterminacy with respect to any whole that perhaps underlies the suspicion with which many feminists have greeted a Deleuzian-inspired understanding of corporeality that leaves behind the confines of the material flesh. Where in the recent past the task has been to conceptualise a bioethics that takes full account of the body (Shildrick and Mykitiuk 2005), and that simultaneously challenges science to acknowledge lived experience and the humanities to rethink material data, we now need to go further not only in acknowledging the intersectional constitution of that body, but in recognising that we can no longer take for granted the human as a discrete category of privileged ethical consideration. Yet for all that supplementation, hybridity and assemblage are the markers of embodiment, we are still here with some distinctly human expectations and hopes for our own flourishing. As such there is an urgent need to rethink the parameters of bioethics to answer to both our aspirations and our anxieties in the context of complex changes. It cannot come from reaffirming the humanist subject, rather as Rosi Braidotti puts it: "A posthuman ethics for a non-unitary subject proposes an enlarged sense of interconnection between self and others, including the non-human…by removing the obstacle of self-centred individualism" (2013, 49). For Braidotti such an ethics devolves on sustainable forms of transformation, "adequate assemblages [that] create the kind of encounters that are likely to favour an increase in active becomings" (2006, 217).

The problem of course is that human beings—at least those who live and are educated in the global north—may still have most of the power but are no longer in control (if we ever were) of where specific encounters might lead. In the context of entanglements that are non-determined, in which the stability of human being itself is increasingly at stake, we all remain vulnerable in our exposure to unknown others in their multiple forms. Some of those encounters will be positive, whilst others will be damaging, even deadening. But if, as I have argued elsewhere (Shildrick 2002), vulnerability is the shared condition of becoming, then we are not alone in our exposure, and by the very nature of interconnection and assemblage both the pleasures and the burdens are distributed throughout the collective. There can be no return to a lost Eden of secure knowledge and a protective ethics that insulates or immunizes the one against the other. When the way ahead cannot be determined in advance, the ethical task resides not in pre-given evaluations, but in taking the risk that the processes into which we are drawn, the assemblages through which provisional forms of embodied selves will emerge, will continue to sustain our unassimilable differences and to maximise our diverse potentialities. I look forward to a corporeal ethics in which risk and vulnerability are the very conditions of becoming.

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Chapter 15
"Let Me Show You": A Caring Ethnography of Embodied Knowledge in Weaving and Engineering

Tania Pérez-Bustos

In 1986, Thomas Hughes, in dialog with other socioconstructivist approaches to science and technology of the time, proposed the concept of sociotechnical systems as shaped by inseparable categories of science, technology and society; not as if they were interwoven but rather intimately the same. This idea of a network without seams was, for Hughes, also applied to knowledge production, for "scientific knowledge, too, is part of a seamless web incorporating so-called social, political, and ideological dimensions along with the conceptual content of science" (1986, 289).

No scholar who critically studies these issues nowadays would deny the importance of understanding technoscience from this perspective. I suggest, however, that the metaphor used to describe this intimate configuration of sociotechnical systems is deeply problematic, in the sense that it renders invisible inequalities, differences and mediations in the understanding of knowledge production within science and technology, and in knowledge production itself. There is no weaving without seams. Seams, as born out of intimate relations between humans and non-human materialities, are central to the act of creating webs; that is of engendering as much as of sustaining relationalities, as in ecologies, not as in networks (Puig de la Bellacasa 2010), of acknowledging and embracing embodied (as matter) vulnerabilities. This is both an ontological concern related to craft tissues—as a conjunction of hidden, messy and sometimes broken seams and mends—and to weavers—as actors playing the role of invisible seamstresses and menders in the shaping of webs.

Considering this I ask throughout this chapter, what are the implications of thinking about knowledge production as a weaving process? What clues does a feminist posthumanist ethnographic approach to the craft of weaving give to the

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_15

re-dimensioning of technological knowledge production, and engineering in particular? These are some of the questions that I attempt to address through the analysis of the knowledge encounters between engineers, *calado* embroiderers—locally known in Cartago, Colombia as *caladoras*—and their materialities.[1]

I am interested in foregrounding that the analysis of these encounters consists of a very local and situated attempt to think form a feminist posthumanist perspective the intimate and fragile relationalities that sustain knowledge production; that is relationalities that bring forward, when thinking about material knowledge practices, the mutual constituency of human and non-human matter as vulnerable, as *becoming with* precariousness. In this sense, this piece presents a concrete example of what feminist posthumanities look like in a particular corner of the global south. It is not a theoretical meta-discourse about intra-active models that entangle matter and corporality. On the contrary, it is a very modest methodological and partial appropriation of these discussions to think of weaving as an embodied knowledge practice that shapes and affects, the ethnography of a concrete knowledge dialog; giving life, for example, to research questions, but above all to knowing-matters which resemble situated invisible feminized labors such as mending, its materialities, messiness and ruptures.

When I say this chapter is a modest and partial appropriation of feminist posthumanities, I refer to the geopolitics of knowledge that objectively affect the possibility of accessing to theoretical discussions taking place in the global north, usually an Anglo-Saxon world. In this sense, while this piece might be perceived by some as lacking theory, it evolved as searching feminist posthumanist theories from the ground, as materially shaping feminist posthumanist theories in that search, as trying to make sense to the partial access of feminist posthumanist Anglo-Saxon thought about the political agency of matter in order to comprehend that weaving, as knowledge and as a material knowledge practice, could not be embraced without "listening" to weaving materialities—both human and non-human. Having this in mind this piece is a local attempt to argue for the need of feminist posthumanities to engage in, or better, to critically embrace, materially speaking, the question about knowledge production, cradling non-academic indigenous and feminized ways of knowing, which are only possible through and with embodied matter (Puig de la Bellacasa 2015). So how can *calado* help in this endeavor?

[1]These encounters were the main purpose of a research project entitled "Embroidering self-knowledge: systematization of experiences and participatory design of weaving as a caring practice in Cartago, Valle." Project participants consisted of: a community association of *caladoras* in Cartago, Valle; a group of five engineers; and two ethnographers (including me). The knowledge encounters took place in both Cartago and Bogotá. Some of them implied the learning of the craft by non-embroiderers (that is engineers and ethnographers) from the *caladoras*' hands, others the collective exploration of electronic embroidery materialities (conductive threads and fabrics, *lilly-pads*, sewable lights and sensors). These encounters and the social and domestic reality of *caladaoras* were the central focus of the ethnography, in which all members of the research team, not just the ethnographers, participated in different ways.

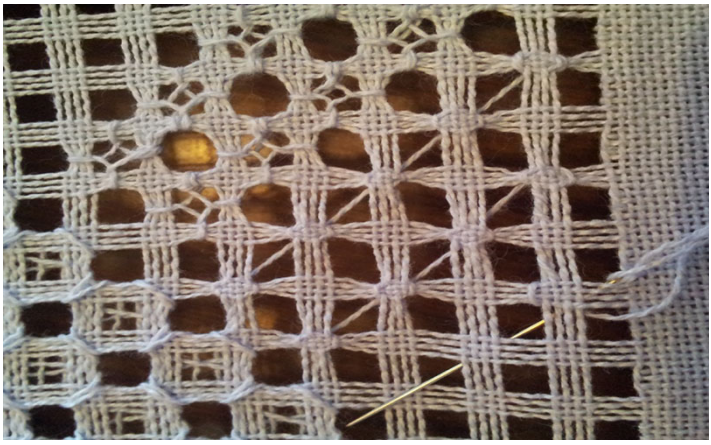

Fig. 1 *Calado* in process: it shows a partially de-threaded cloth and the production of a stitch called *Punto Espíritu*

Calado embroidery can be seen as a form of weaving in the sense that it produces a decorated structure by reconfiguring the original warp and woof of a piece of cloth. Thus c*alado* embroiderers spend a great deal of time partially destroying the original structure of the fabric, de-threading it, *deshilandola*; weakening the fabric by taking out one thread at a time from each side and so generating a bigger grid than the original. The produced grid is then used as a base on which to embroider. *Caladoras* use pointless needles to weave threads of the same color as the original cloth between the created holes and within the leftover threads. This generates a new structure that, in addition to aggregating another incorporated design into the fabric, also re-strengthens the weakened cloth (see Fig. 1). In other contexts, this process is called needle weaving (Cunha and Vieira 2009).

The knowledge encounters mentioned above, between women embroiderers and engineers, were oriented towards recognizing the knowhow of *caladoras* as becoming with an intimate relationship with *calado* materialities, and through this recognition propitiating the becoming of a technology.[2] In this sense, the ethnography's main aim was to unravel *calado* knowledge making practices as a central component of the co-design of a tangible user interface (TUI).[3] Indeed, this interface evolved out of a process of learning the craft in order to embroider the

[2]When referring to *become with* and *becoming*, I am thinking with Donna Haraway's (2008, 2013) reflections about relationalities that exist in the making. That is that are dependent of the act of touching the other human-non-human, and so are world-making practices. Following Vicky Singleton's (2011) input on this discussion I think of this processes of *becoming with*, *becoming worldly* as mundane practices of responsibility. More recently Martha Kenney (2015) has elaborated on this idea of responsibility in relation to research as matters of care.

[3]Tangible user interfaces are designed to generate tangible interactions with the digital world through personal tangible objects (Reitsma, Smith, and van den Hoven 2013), in this case, for example, through threads that can be embroidered.

technology (Pérez-Bustos and Franco-Avellaneda 2014), which involved computationally representing *calado* stitches without automatizing its knowhow.[4] It is not the purpose of this piece to explain the characteristics of this tangible used interface,[5] but to present how an ethnographic approach to *calado*, one inspired by feminist posthumanist reflections, as the ones previously presented, can question, and from there be with, accompany, the design process of a particular technology.

In my ethnographic analysis of *calado* making practices, I have come to the conclusion that *calado* (as weaving) is a matter of care. This implies comprehending it as being possible only through and as constituted by practices oriented towards the sustainability of life (Fischer and Tronto 1990), especially in the domestic sphere. *Life* here refers to embroiderers and their families, their economical livelihoods as much as their wellbeing, but also to the vitality of the craft itself; the re-birth of the cloth after it is carefully destroyed and mended in the de-threading process explained above. These two dimensions involve symbolic and labor practices of seaming and mending which in turn are only possible through the intimate knowledge of how fabrics and threads behave when manipulated through *calado*, but also to what this intimate encounter does to embroiderers' states of mind, generating pauses within their routines as much as repairing their sorrows. I argue that these interdependent practices sustain knowledge, even when they are invisible, feminized and precarious. In this sense, thinking with Puig de la Bellacasa (2011, 2012), knowledge as weaving is not a matter of networking but an ecology where vulnerabilities and neglected things are at the forefront of our comprehension of the world. Meaning with this, the vulnerabilities of embroiderers livelihoods and wellbeing which are, paradoxically contained by mending processes of carefully destroyed fabrics, as Haraway woud say, the ecology of *calado*, as a material trope of knowledge has worlding effects (2013), it amends and restitutes, it gives new esthetic meanings to broken structures.

Thus, my work as an ethnographer participating in the mentioned knowledge dialogs between engineers, embroiderers and embroidery materialities can also be understood from a caring perspective. As an ethnographer, I am a caring observer and listener (Watson 2014), whose participation in the process contributes to sustaining the web of relations between these human and non-human actors. To give life to their dialogs: implied propitiating a mutual recognition through which these actors touched each other and became with and through that mutual touch. Now, this approach to ethnography, while detached from the idea of it as a producer of

[4]This goal of not automatizing the craft was inspired by Suchman (1999, 2002) and her interpretation of automation as a practice that comprises the objectification of knowledge in new material forms. These practices are usually constructed as marginal and disposable, and so are their practitioners. However, as we will see, such forms and practices of knowledge and their material dimensions are central to complex ecologies of knowledge production, and paramount to the maintenance and continuation of life. To view other examples of TUIs inspired by weaving, see (Reitsma et al. 2013; Rosner and Ryokai 2008).

[5]For this, see Cortés-Rico, Márquez-Gutiérrez, and Pérez-Bustos (2015), Cortés-Rico (2015) and Pérez-Bustos, Cortés-Rico, and Márquez-Gutiérrez (2015).

texts, understands it as an experimental and experiential encounter, which is constituted by mending processes through which each part is recognized as part of a wider ecology.

Therefore, the tangible user interface was engendered by and through knowledge dialogs, in which I, as an ethnographer, engaged as a caring observer and listener, as a mender, of the technological decisions taken along the way. This process allowed me to trace the representations that embroiderers and engineers had about their work and about technology, and the imaginaries that both groups had about what counts as technological knowledge and as user knowledge. My observations also uncovered the hierarchies between the two groups, the practices and narratives about and with material things that mediate learning about embroidery and engineering, and the interdependencies that configure the possibility of mutual recognition within the collective of humans and non-humans that are part of the process. These representations, imaginaries, narratives, practices and interdependencies are the central core of my research. My questioning of them allows me to depict the role that weaving, and its ecology, has in terms of shaping relations between humans and non-human actors and the practices of knowledge production they embody. I understand this as the warp and woof of a weaving, one that might need to be carefully destroyed sometimes in order to allow ethnography to become responsible for a touching encounter between other forms of knowledge. In this context weaving and its constitutive patching ups, are not just a metaphor for prospective knowledge, but a collective embodied materializing form of worlding; that is a concrete example of the knowing-matters that inspire feminist posthumanities in the global south.

In order to present a more detailed overview of the possibilities of understanding weaving as knowing-matter, I will present *calado* embroidery as seen from two perspectives: zooming out and zooming in. I see these as two movements that start from concrete *calado* materialities: the first one goes beyond them asking about the labor that sustains their existence and its conditions of vulnerability. The second movement goes inside those materialities and their unseen structures. With this, I aim to provide an account of how seaming and mending in embroidery are central to thinking about knowledge production in general, but also are key practices (involving human an non-human actors) which pose central questions to technology design.

Zoom out: Weavers, Seamstresses, Menders

An initial aspect that weaving highlights when it is used as a trope for knowledge is the labor behind it: the subjects who embody it, the relationalities between them, the craft and its materialities, and the place they have in a particular social order.

As a practice of care, *calado* (as weaving) is a feminized activity, crosscut by class and gender. These intersections are, however, usually invisible in the final product, and this, in turn, contributes to the precariousness of the activity and its

Fig. 2 Unfinished statue of a *caladora* located at Casa de la Cultura in Cartago, unknown local artist

potential loss.[6] A symbolic example of this condition is portrayed in Fig. 2. I found this unfinished statue while wandering around Cartago trying to find archives and public representations of the craft. In general, while *calado* is nationally known as a very delicate and fine embroidery technique, locally the labor of those who create *calado* pieces is hidden within households and has little public support, financial or otherwise. This unfinished statue serves as a poignant metaphor for how lonely and forgotten the craft and its crafters are.

The act of weaving is performed by *caladoras*, socio-economically privileged women of advanced age, who are assisted by laborers, *obreras*, who are either low income women who work as maids or male prisoners who find solace during their incarceration by learning the craft. *Obreras* and prisoners are also *caladoras*,

[6]As I have stated *calado* entails practices of carefully destroying and mending fabrics. These practices are time consuming and very little recognized economically speaking, but also in social terms in relation with younger generations. A *caladora* can embroider a piece in about a week and only receive for this labor 8-10 US dollars. In this context *caladoras* livelihoods poorly depend on this labor and this explains why their children, mainly their daughters, are not interested on learning the craft. The marginal status of mending practices and labor has been discussed also by König (2013) in the UK midland Europe and North America.

Fig. 3 This picture shows the mending of an old broken cross-stitch embroidered blouse with a new piece of cloth the same color as the original. The mending is performed through *calado*, embroidering the edges of the old cloth with the new one

however the knowledge they have about the technique is less complex that the one that their masters possess; this in the sense that they are used to only embroider what is asked for them to, and are able to make fewer types of stitches.[7] *Caladoras*' knowhow and learning is embodied in their hands. When asked to explain what they are doing, they reply "let me *show* you," whereupon they grab the needle and start to explain the technique while making a stitch. On other occasions, when some sort of abstraction about the process is asked for, they answer "I cannot do it rationally, if I think about it too much I cannot do it." Here, doing something rationally means verbalizing a process that is spoken through hands and material movements; an embodied knowledge, a knowing-matter, which can only be learned through making it.

One thing that *caladoras* learn early on is that quality is related to the ability to hide the hand of the embroiderer in the final product. Thus, a key element of the process is composed of mending small errors by manipulating the materials and seaming pieces of thread and fabric to camouflage the labor of embroidery within the embroidery itself. This implies a very intimate relationship between the embroiderers and what is embroidered, a relationship that is built up through time and practice (see Fig. 3).

In this context, where matter-knowing is embodied in *caladoras*' hands and at the same time hidden through mending practices, it is not possible to learn *calado* by

[7]In this paper, when I refer to *caladoras* I am not distinguishing between laborers and masters.

oneself. Knowledge is passed through the sensory accompaniment of other *caladoras*, and so it has an affective and collective nature that is non-verbal and takes place in between other caring practices, such as raising children, looking after family members with disabilities, doing domestic chores, or as a way of finding solace of the daily routine or meditating while in prison. The invisible, collective and affective nature of embroidery knowledge, which has also been documented for craft learning in other contexts (i.e. Portisch 2010), is in danger of disappearing given the commodification of the craft in a time when textiles are mass produced under conditions of exploitation (i.e. Ahmed 2004; Borgeaud-Garciandía 2009). Thus *caladoras* nowadays learn to be efficient and avoid embroidering the more complex stitches, since "it does not pay to do them." They use cheap materials that affect the *life expectancy* of the craft, and they do not share their knowledge with other embroiderers, who were previously their learning peers, because they are now considered potential competitors. *Calado* making practices belong to a temporality that is in tune to the rhythms of the body. A body that *becomes with* the invisibility of its labor, a labor that is learnt through getting use of fierce fabrics with threads that do not want to be de-threaded. This temporality, however, the knowledge it sustains, is neglected by the timescape of the market, one that privileges products and efficiency rather than learning processes and woven collective endeavors.

Now, what are the questions that this approach to *calado*, its making practices, bodies and materialities, pose to technology design in the knowledge dialogs previously mentioned? The worlding effects of the ecology, of weaving as an embodied knowledge, the labor behind it, shape a particular understanding of the craft held by engineers, and of the goal they set for engineering itself. In part, these understandings are constituted by the fact that engineers belong to a very masculinized and prestigious field, which contrasts with the precariousness and invisibility of *calado*, central components of its feminization (Pérez-Bustos 2014). In some cases, this contrast enhances the heroic role of engineering as a problem solving practice that is radically different, if not superior, to embroidery knowledge. As an example of this, an engineer involved in the process of designing the interface sees "… Participatory design as a tool that can be used [to design technologies] … while using it, it is as if users would write a letter to Baby Jesus,[8] and we [engineers], as Baby Jesus' goblins, would manufacture the toy they want."

However, a more intimate ethnographic accompaniment to this standpoint (oriented towards making visible precariousness and loss in a context of commodification, and moreover trying to solve this situation) presents a different view of what engineering can learn from embroidery (as weaving), through posing the following questions: What is the labor that sustains engineering on a domestic basis? Where are engineering learning processes embodied? What hidden relationalities and interdependencies with materialities and people maintain the life of engineering products? In sum, if we attempt to think using the trope of embroidery as weaving, how can technology be embroidered (woven)?

[8]The Baby Jesus is the local representation of Santa Claus in Colombia.

Answering these questions is not the purpose of this chapter. Rather, my aim is to present and think through them in my own practice of becoming responsible, and so caring, participant of the design process and the knowledge dialogs that sustain it. I intend to imagine the possibility that knowledge production in general and in technology in particular can be embodied in the process of embroidering. Thus, in thinking through and with *caladoras*' hands and materialities, I face the slow practices of doing and undoing as central components of crafting. I grab the needle and try to reproduce a stitch, thinking aloud with my hands that it cannot be done in the way I think it can be done, and then a very old *caladora* says to me, while guiding me with her hands, "keep on doing it, keep on doing it, *hágale, hágale*, if we get it wrong, we just undo it and start all over again." Indeed, knowledge can also be a slow crafting process, one that resizes the value of carefully destroying, mending and undoing-redoing, and embraces the neglected temporality of care[9].

Zoom in: Ruptures and Messiness

A second aspect that weaving highlights when used as a trope for knowledge production in general, and in technology design in particular, is its material nature. At first sight, the materiality of *calado* stitches gives the impression of a very organized and symmetrical flux of threads that creates different tessellations (Fig. 4).

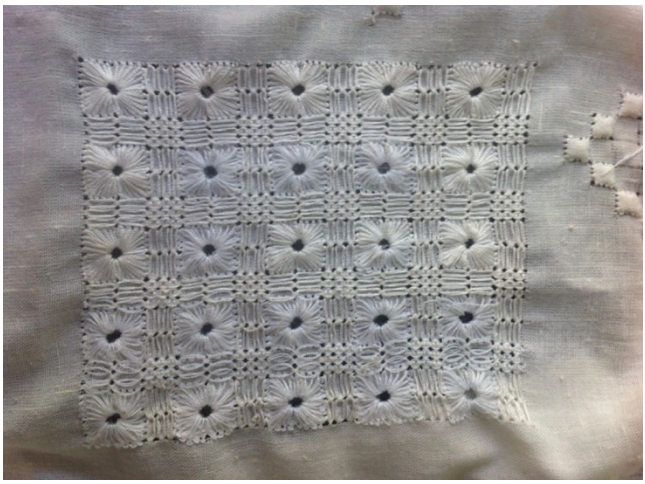

Fig. 4 A finished *calado* sample

[9]To explore further discussions on slow knowledge production and its implications in the neoliberal context of contemporary universities, see Mountz et al. (2015).

Following Ingold (2007), the coming to life of this materiality is only possible through a practice whereby threads become traces and, to some extent, forms of writing. This reminds us of the semantic liaison between textiles and texts; one that embraces the role of hand an tools (Tedlock and Tedlock 1985), its confidant relation, when making sense of the world, when world-making (Haraway 2013). As I have said, before commodification of the craft or even in the interstices of it, when *caladoras* carefully de-thread and then re-inscribe the thread into the fabric, through mending, they are, somehow, performing care in the domestic sphere; care for others but also care for oneself, meditating and healing the burden of daily life. "I do not need therapy when I embroider", "Only calado helped me to mourn the death of my children". Thus *calado* writes stories of care, though these stories are only legible through the crafting process in itself, through its knowing-matter, and not to strangers to the practice. In this sense, *calado* embroidery is a very situated and embodied form of writing as a kind of worlding.

For those unfamiliar with the process of making threads turn into traces in the creation of *calado*, what comes first are the tessellations that this technique produces; not the process of writing them and its worlding effects. Thus the stories of care inscribed in the movements are displaced to center the attention on how the primacy of order and flux can suggest mathematical ideas about the infrastructure of webs. In other words, the caring taking place while embroidering/weaving/mending exist as subordinated to the webs this processes produced. Engineers do not understand those practices as knowledge in themselves but as producers of something that has knowledge. Thinking with Helen Verran (2001), it is not that engineers understand knowledge production different than embroiderers, it is that these are different forms of embodied knowing-matter, ones that are not always legible to each other. So, in the knowledge dialogs, engineers question about what they can learn from this: How can those movements be decoded in order to explain the substrate of tessellation making? What can we learn about web making from describing, not the practices, but the traces performed by threads? This impulse to decode and comprehend the craft beyond its local and concrete setting of embodied (human and non-human) creation configures imaginaries about engineers as the kings of symmetry and order, values that in turn shape a particular gendered idea of objectivity in knowledge production, one were materialities are objects without agency, at the service of human thought. While *caladoras* write caring stories in *calado*, through an intimate relation with threads and needles, engineers want to decipher hand movements, initially detaching them from their caring context in order to identify a more universal language with which to think of webs, a language beyond careful destruction and mending.

But embroidery is not as ordered and symmetrical as it seems. However, what supports this impression? A closer look at *calado* helps us to comprehend the material substrate that structures what engineers perceive as a symmetrical web order. Figure 5 was taken of a piece of *calado* embroidery using an electronic microscope in a university lab. The embroidered cloth was taken out of its context to be deciphered by machines in the hope that this would provide information about the movements fixed in the threads, about the grammar that traces

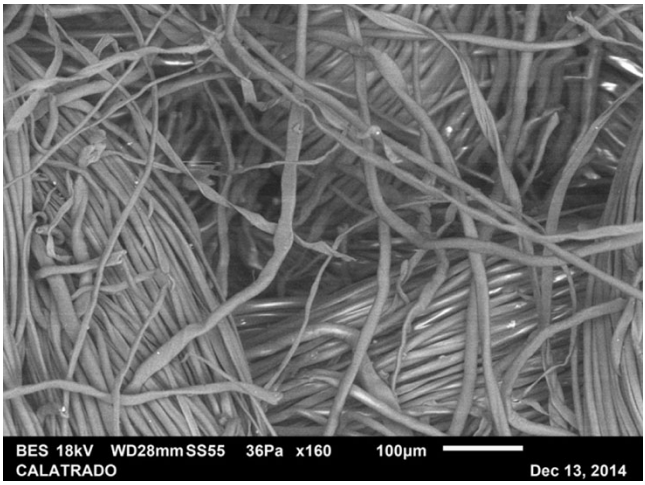

Fig. 5 Microscopic image of a *calado* piece

tessellations and in turn symmetrical web making. A sense of information that, as I have said does not recognize caring practices as knowledge practices.

In its attempt to scientifically decode the *calado* language, engineering finds that order is sustained by an unexpected messiness and ruptures "in the unity of embroidery tissue—first comes disorder and lots and lots (more than I expected) of broken fibers and threads" (electronic engineer). This finding questions the impossibility of automation understood as a merely mathematical process, it highlights its material impossibility. Ruptures are indeed produced by both careful destruction through de-threading and mending practices, aspects that constitute *calado*, as well as tessellations. What does this image tell us about knowledge production, about knowing-matters, as weaving, as caring? What does it imply to think of weaving as constituted of broken threads, of *calado* as emerging from carefully destructive processes? How does an ethnographic approach to this materiality, in dialog with the bigger picture of *calado* and its labor, contribute to a particular esthetic resignification of order in our perception of scientific and technological knowledge production?

A Very Brief Attempt to Close These Lines

To answer the above questions it is central to unfold how knowledge making, in its ontological diversity, is crosscut by care (Puig de la Bellacasa 2011)—not as a moral mandate, but as a learning process. The latter, especially, when giving account of how such an approach gives clues to feminist posthumanities in the situated comprehension of (and the involvement, becoming with) the relationship and ecologies between humans and non-human actors. In here it has been

important to highlight that those ecologies exist and are sustained by practices of careful destruction and mending, practices that are knowledge in themselves and that exist, precariously, in the domestic arena between other caring labors.

For feminist posthumanities, acknowledging the tensions that this ecology poses to engineering and its embedded values is important, but it is more important to become responsible of those tensions, through propitiating other forms of encountering. In doing so feminist posthumanist ethnographies, such as the one I have referred to here, have the potential to patch up the interdependencies between crafts, the knowledge they embody and the materialities that allow their existence. Thus, approaches such as these ones allow the vulnerability of *calado* (its practices of careful destruction and mending) to emerge as a possibility to imagine posthumanist feminist theories as knowing-matters that write and weave about the various academic and non-academic practices that can produce them. These are feminist posthumanist theories which *become with* precarious, indigenous and feminized ways of knowing, its craft and labor, its practices of knowledge production born out of particular matter and embodied intimacies: the precarious lives and livelihoods of women in the south and its interdependency, reciprocity and co-constituency with *calado* materialities.

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Chapter 16
Anatomical Assemblages: Medical Technologies, Bodies and their Entangled Practices

Ericka Johnson

Sometimes in medicine it is hard to see what you want to examine. Sometimes it is even hard to feel what you want to touch. The female reproductive tract is an example of anatomical structures that can be hard to examine with the bare eyes and even the bare hands. It can be hard to see them, feel them, examine them to determine their shape, their size, if they have growths in or on them, if they are healthy or diseased. A doctor's fingers and hands can approach them, and other technologies—like ultrasound wands and various scans—can be used to create images of the parts to complement the tactile impressions the doctor collects during a manual examination. But knowing what they are, knowing them, is a complex practice.

What this chapter considers is how the patient body is a knowledge phenomenon emerging within the medical practices used to examine it and through the technologies used to model it. Discussing specifically the bimanual pelvic examination for women, I explain how the Baradian concept of intra-action (Barad 2003; Barad 2007) is a useful tool to think through the use of technologies in medical examination practices.

First let me describe a conundrum—an empirical example—that can be theoretically approached with intra-action. It involves a gynaecological simulator designed to teach new doctors how to conduct the bimanual pelvic examination, that standard examination a woman is subjected to when she goes to the gynaecologist. This simulator was designed and validated in the USA, with medical studies and publications saying the body was anatomically correct and the simulator functional for the examination. But when it was brought over to Sweden, the doctors using it there said it did not work, even though they were supposedly doing exactly the same examination as was being taught in the USA.

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_16

In the bimanual examination, the doctor uses his/her hands to feel the cervix, the uterus and the ovaries. Sticking two fingers of one hand into the woman's vagina, the doctor first feels the cervix. Then the doctor pushes the uterus upwards towards the roof of the woman's abdomen, and, pressing down on top of her abdomen from outside the body with the other hand, squeezes the uterus between the hands to feel for its shape, position, size and if there are any growths on it. Then the doctor does the same manoeuvre for each of the ovaries, squeezing them between the fingers inside the vagina and the hand on top of the abdomen, also checking for size and growths.

This is a difficult examination to learn how to do. Not only can it be an emotionally charged practice for the woman and for new doctors—invasive and tactile—but actually finding and feeling the various parts of the anatomy, especially the ovaries, can be hard. The simulator was designed to be both a tool to practice on without the potential embarrassment for the doctor or the patient, and one which could be used repeatedly until the doctor or student got it right and felt confident about his/her skills. It is also a tool that gives feedback on the quality of the examination.

Inside the simulator, on the cervix, the top of the uterus, and on each of the ovaries, are small pressure sensors, which send a signal to a computer when the student doing the examination touches each of these anatomical parts. The signal both indicates that the student has felt the correct body part and shows how hard s/he pushed. By reading the charts on the screen, the students and the teacher can know if the examination was done correctly—both if the student examined all the proper bits of the anatomy and if s/he did it firmly enough to feel properly, but not so hard as to hurt the patient.

Consuming the visual, digital feedback on the computer interface, the student is supposed to develop an idea of how it feels to touch a "real" cervix, uterus and ovaries in the flesh. The student is also supposed to develop an idea of how the patient "feels" being touched, how the patient experiences it. Simultaneously, the student learns what the cervix, uterus and ovaries "are", which is one step further than what they feel like. The student is expected to map this new experience onto their existing anatomical knowledge and create a new understanding of the female body's reproductive organs. This is a particular, tactile knowledge of the anatomy. We may think we know what a uterus is because we have one—or at least came from one. But after the conducting the examination, the student knows that anatomy in a different way. The student has felt what the uterus is when pressed between his/her hands. Using the simulator creates a tactile-visual-imagined uterus, cervix, and ovaries, an anatomical imagining that is specific to the experience of the simulator while simultaneously claiming to be universal knowledge of the body (Fig. 1).

That knowledge is, however, still very specific. The simulated human anatomy is the way it is because of the design of the simulator, and it is there to allow the medical student to learn that body as the normal and the practices of examining it as normal/natural. The human patient (or at least its cervix, uterus and ovaries) becomes an assemblage of how the sensors and silicon respond, becomes

Fig. 1 The inside of the simulator and computer display

constituted by the machines, the technology and materials and the palpating hands, all trying to create a coherent understanding of the human body. Theoretically approaching this through critical posthumanism can decenter this coherent understanding. As Nayar asserts, critical posthumanism can see the human "…as an instantiation of a network of connections, exchanges, linkages and crossing with all forms of life" (Nayar 2014, 5).

This network becomes even clearer through the prism of the simulator. Thinking about it as connections, exchanges, linkages, one can see that the human it is creating is an information hub of what it means to be a human. Nayar posits that "The human as a dynamic hybrid in critical posthumanist thought focuses not on borders but on conduits and pathways, not on containment but on leakages, not on stasis but on movements of bodies, information and particles all located within a larger system" (Nayar 2014, 10). This approach focuses an understanding of the gynaecological examination as a movement of information between the patient and the doctor—in both ways, as if at the moment of the touch on the uterus, the cervix or the ovary, patient-student-body-hands are all one assemblage. The body of the simulator becomes a mixed reality assemblage, virtual and physical, creating a subject to be felt and a subject to do the feeling, but also building very experiential consciousness (cf. Nayar 2014, 64f).

In *How We Became Posthuman* (1999), Hayles develops the idea of the human consciousness as informational patterns, materialized in different bodies, different locations, computers, machines or flesh. Through the feedback loops that register and then display the pressure exerted on the different anatomical parts, the gynaecological simulator simultaneously embodies the consciousness of the designers and programmers (cf. Sundén 2010; Prentice 2013) but also the imagined consciousness of a gynaecological patient. The responses to pressure are embodied into the simulator and communicated back to the doctor–student through the medium of this multi-modal simulator.

Interrogating where in the simulator assemblage patient and doctor consciousness are located and materialized, and what they are allowed to articulate, says much about gynaecological knowledge and patient subjectivities. As Ferrando says, "Posthumanism investigates technology precisely as a mode of revealing, thus re-accessing its ontological significance in a contemporary setting where technology has been mostly reduced to its technical endeavours" (Ferrando 2013, 29). The consciousnesses—in the plural: designers', patients', students', doctors'—that are materialized in the simulator become entangled, articulated as a assemblage, almost a mash-up of understandings about the body and technical limitations and facilitations. But these understandings materialized in the simulator can still be interrogated by conceptualizing of matter as a process of materialization (cf. Coole and Frost 2010) and, drawing inspiration from Kirby, trying to "eschew appeals to truth by unravelling their narrative structures as well as their hidden political economies" (Kirby 2012, 198). One can do this by applying analytical tools from Barad's agential realism.

Remember the conundrum: when the simulator arrived in Sweden, the gynaecologists were frustrated that they could not do the bimanual examination on the simulator. "What?" I thought. "It was designed specifically for that exam… Why not?" Well, it turned out that the Swedish gynaecological examination also involved one extra element: flipping the uterus forward with the fingers in the vagina so that the hand on top of the abdomen could feel for growths on the back side of the uterus. The US doctors—whose practices were the basis of the simulator design—did not do this part of the examination. So the engineer designing the simulator ran the wires from the pressure sensors along the back of the uterus and out through the pelvic bone to the attached computer. These little wires, sending digital signals between the flesh conducting the examination and the consciousness embedded in the simulator, these pathways of distributed human–machine entanglements, unwittingly held the uterus in place. When the Swedish gynaecologists tried to flip it forwards, they could not. Part of their examination was not executable on the simulator.

A minor glitch in the simulator—a simulator that the medical literature had already proven was valid, whose model of the body was deemed realistic enough to represent the female anatomy for both teaching and testing purposes—but one that articulates that the way a body is known—what practices of examining it create knowledge about its anatomy and thereby knowledge of what body can be validly represented in a simulator—is ultimately dependent on *how* the body is known. The practices of knowing it create the body that is simulated (Johnson 2008).

The work with the Swedish gynaecologists and their frustration with the machine (and interviews with the simulator's inventor and the designer of the mannequin used in it) showed empirically the importance of closely attending to the how, the practice, of knowledge making with medical technologies, be they doctors' hands or high-tech scans. It showed the importance of seeing the minute elements of practice, watching for the details. But explaining why this is important theoretically took a broader perspective drawn from feminist science studies and its work with materialities and material bodies, and required it to be applied to the minutia of observed practice.

To understand why that level of detailed empirical observation is important within feminist science studies and for STS and Medicine, it is helpful to start out with discussions of how the body has been known in the past, like Laqueur's work on the one-sex body, where he discusses the way cultural perceptions of gender and sex have influenced the medical understandings of the sexed body (Laqueur 1990), along with other work about gender and medical knowledge making (Schiebinger 1993). And while the details of his work have been contested (Laqueur 2003; Schiebinger 2003) it is a good place to start thinking from when wondering about the relationship between gendered concepts and sexed bodies in medicine (see also Johnson 2005). There is other useful work about the medical body, some of it historical, other more easily categorized as cultural studies, which talk about how anatomies of the body are dependent on the tools and technologies used to dissect and draw or otherwise reproduce images of the body (Cartwright 1998; Jordanova 1998; Jordanova 1999; Waldby 2000) which can help to approach questions about simulators and the context dependent ways they reproduce practices of knowledge rather than ontologically discrete anatomical units (Johnson 2008). Related to this, and equally important especially when thinking beyond simulators to the way practices of knowing the body are relevant to how those same practices also know pathologies, is the recognition that concepts of the body and pathologies are flexible, malleable, inextricably connected to "social" understandings of the human, health and technology (Martin 1991; Martin 1992; Wailoo 1999; Mol 2002).

However, *inextricability* and "social" in quotation marks are unwieldy terms, frustratingly useless theoretical tools, important but awkward. When working with the e-pelvis, I was trying to find a theoretical toolbox that provided terms and concepts to express and explore ideas about these bodies-in-practice comfortably, practically, and usefully. And it is for this challenge that I have found Barad's work with intra-action to be useful.

The conundrum, then, was how to explain that a validated model of the female body would work for the bimanual examination in one country, but not in another, even though the examination was supposed to be the same thing. The answer—put simply—was that the examination was not actually the same. In the US, the examination involved feeling the size and front side of the uterus. In Sweden, that same examination also involved feeling the back side of the uterus. So a simulator built for the US examination did not work for the Swedish examination.

That is it put simply. Here is the complication: What this means is that the simulator is not simulating a female body, it is simulating a female body as known

through a very specific gynaecological examination. In fact, the simulator is not so much reproducing an anatomy as it is reproducing a way of feeling various parts of the female reproductive tract. Recognizing this changes the concept of the simulator from being a reproduction of a physical body to being a reproduction of a way of manipulating and experiencing that body. The simulator is not reproducing a thing, a noun. It is reproducing a way of knowing, a verb. It is reproducing a knowledge phenomenon.

The simulator is simulating how medical professionals interpret and read the patient body, not the patient body as such. The validity or fidelity of the simulator is based on how well the simulator recreates the signals medical professionals use to understand the body, how well the simulator recreates the way we know the body. Discussions about how this can be done can sometimes discuss "engineering fidelity", which means how well the simulator replicates the physical characteristics of the medical task, and functional fidelity, which means how well the simulator recreates the skills of the real task. What both of these terms take for granted, though, is that it is a task—a practice through time—that is being simulated, not an unchanging, objective anatomy. The simulators are not recreating bodies per se, they are recreating the necessary environment and ability to execute specific medical practices. The simulators are recreating the experienced body, and how the body is experienced is dependent both on what types of technologies are used to know it, and what specific medical practices are done to the body.

Drawing on Latour (1993), one could describe the simulated uterus as a node in a sociotechnical network, materialized. That it is a node becomes apparent when it malfunctions in the Swedish context. At the materialization of the uterus, different actors (actants) emerge and meet: the knowledge phenomena of US gynaecological examinations, the bimanual practices of the examination in Sweden, the material technical constraints of simulator production, the technical demands made on those constraints by design issues, particularly tactile and digital ones. But what this description misses, and what the posthuman, Baradian analysis helps one see is the constant materialization that is occurring when the uterus is being examined. The phenomenon of knowing the uterus is materializing it in ongoing practice. Seeing this happen in the silicon model of the flesh uterus forces an interrogation of what a uterus "is".

This is where Barad's way of thinking about the world with agential realism becomes useful. Within the theory of agential realism, "Phenomena are constitutive of reality. Reality is not composed of things-in-themselves or things-behind-phenomena, but things-in-phenomena. … What is being described is our participation within nature" (Barad 1996, 176). To use an agential realist analysis, one sees phenomena as the basic unit of existence, not subjects and objects. "That is, phenomena are ontologically primitive relations – relations without pre-existing relata" (Barad 2003, 815).

Within the phenomena being analysed, the concept of intra-action explains the details and actors in the practice of knowledge phenomena. With intra-action, the distinction between subjects and objects as separate entities, a dichotomy of knower and known, is erased. The term dissolves the boundary between objects and "agencies of observation". Intra-action signifies that the object of knowledge

cannot be separated from the way, the practice or phenomenon that makes it known. This is in contrast to the more common term interaction, which reinforces the separateness of the object and the method of observation (Barad 1998, 96).

Intra-action reflects Barad's dismissal of representationalism, which is particularly interesting when discussing simulators and simulations. Instead of representing, the referent and the object of observation (and by extension the person doing the observing) become intra-acting subunits of a phenomenon, all of which are necessary components for the phenomenon to be observed. And what is described by the observations is not nature, but the intra-active participation of all the subunits (Barad 1998, 105). Analytically, the term intra-action becomes useful because it articulates the local, specific practices involved in making what Barad calls agential cuts. It provides a way of analysing the details in knowledge practices.

The patient body is a knowledge phenomenon dependent upon the medical practices used to know it. With this as a starting point, I have looked at examination practices involving medical technologies which participate in intra-actions used to know the patient body. This approach explains why simulators should be read and understood as the simulation of a knowledge phenomenon, not the reproduction of an ontologically discrete anatomy. The bodies that are reproduced in simulators are more productively thought of as onto-epistomological units, as practices of knowing, reified in medical simulators.

As Callus and Herbrechter note, "It seems that the overriding task for posthumanism, as a critical discourse, is reflection on how the effects on and of contemporary technoculture and biotechnology force through a rethinking of the integrities and identities of the human: not forgetting, either, those of its nonhuman others" (Callus and Herbrechter 2012, 241). This chapter illustrates this using a feminist science studies theoretical position: the application of a Baradian approach to explain observations from close empirical study of a medical technology in practice. It shows how the uterus is known through technology-human intra-actions, both with human uteri and with simulated ones. There are both practical and political implications of these knowledge-phenomena-bodies for medical technology development (with a specific example from medical simulators), which highlights the urgency of engaging with medical practices and technologies using theoretical perspectives from feminist science studies and the posthumanities.

One of these implications is that it repositions our understanding of simulators, and reformulates our approach to their use, from questions of how a simulator can be used to teach medical students to what a simulator *is*. Since it is not merely representing, since it is recreating ways of knowing the body, when using a simulator, students are doing particular medical practices to a simulated body. One can start to ask whose practices they are doing, and how these practices are loaded with cultural values and pre-existing understandings of the patient, the doctor, pathologies and health. Thinking about the phenomena of knowledge about the body encourages reflection about how treatments of the (pathologised) body are conceived of because it can show how diagnostic practices of the body are phenomena of knowledge.

What a theoretical approach which integrates the concept of intra-action enables is the enrolment of technologies of knowing into an analysis of how

knowledge is done in practice. Because, as Barad says, her theory of agential realism "includes practice within theory—theory is epistemologically and ontologically reflexive of context" (Barad 1996, 182). Using the concept of intra-action from this theory, one can see the relational agency of people and things (bodies are both, sometimes simultaneously) and can unpack the networks of actants involved in the phenomena of knowing the body, both the healthy and the pathologized body.

Which leads to another implication: that analysing how the body is known and reproduced in medical technologies, in the artefacts for doing and training medical practices with the help of intra-action, highlights that the practices of knowing and the way practices can be materialized are context dependent, are embedded in specific practices and cultural understandings. This approach explains the presence of multiple patient bodies which emerge from diverse cultural contexts and from heterogeneous examination practices and actant constellations. It also suggests that there can be many different female reproductive tracts, all of which would have to be simulated differently. These multiple reproductive tracts emerge from the different practices and the various materialities of the examinations, a conclusion which shows the usefulness of lessons from within recent feminist science studies, new materialities, and critical posthumanism, as well as for work on and with medical technologies, and even design and interface research. It is also relevant for the makers and users of medical technologies. Analysis of this sort can create space for interdisciplinary conversation and a point of intervention. For, as Barad says, feminist science studies, "distinguishes itself by its commitment to be in the science, not to presume to be above or outside of it. In other words, feminist science studies engages with the science no less than with the laboratory workers, modellers, theorists, technicians, and technologies" (Barad 2012, 207). Or, inspired by Braidotti, approaching a simulator within the theoretical framework of posthumanism engender an attempt to constitute a community of learning that could produce socially relevant knowledge (Braidotti 2013, 11).

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Chapter 17
Practising Ambivalence: The Feminist Politics of Engaging with Technoscience

Celia Roberts

Part One

Technoscience is of immense interest to contemporary social theorists. Post-humanists are no exception: scholars identifying with this moniker, including many contributing to this volume, engage with technoscientific concepts, theories, objects and findings to make their own political and philosophical arguments about human/other-than-human relations and the coming into being of worlds. "There is a posthuman agreement," Rosi Braidotti writes, "that contemporary science and biotechnologies affect the very fibre and structure of the living and have altered dramatically our understanding of what counts as the basic frame of reference for the human today" (2013, 40). Braidotti exhorts colleagues to engage with these fields, suggesting that such engagements constitute "trans-disciplinary discursive fronts" that will reshape the humanities in necessary and positive ways:

> Today, environmental, evolutionary, cognitive, bio-genetic and digital trans-disciplinary discursive fronts are emerging around the edges of the classical Humanities and across the disciplines. They rest on post-anthropocentric premises and technologically mediated emphasis on Life as a *zoe*-centred system of species egalitarianism (2013, 146).

For Braidotti and many others, then, developments in technoscience – particularly genomics, the neurosciences and informatics – form the conceptual and material focus for rethinking Nature, Culture and the Human by providing stories about human and other-than-human life processes and how to intervene in these (Braidotti 2013, 570). Of course, post-humanities scholars do not restrict themselves to the life or digital sciences, engaging with geology, marine science, robotics and physics, to name but a few additional fields of interest. Such

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_17

engagements contribute to broader debates about the Anthropocene, environmental toxins and climate change as well as warfare and healthcare. They also have clear links with the more social science-oriented field of technoscience studies. Indeed, Cecilia Åsberg, Redi Koobak and Ericka Johnson argue that

> feminist technoscience studies – such as the oeuvre of Donna Haraway – pioneered much of the work that today may be called post-humanities… as well as that peculiar philosophical trend of returning to (process) ontological issues as these link up with epistemological and ethical ones (2011, 213).

As Åsberg et al suggest, particular branches of technoscience studies or STS (Science and Technology Studies) – those loosely described as post-ANT (Actor Network Theory) – are deeply interested in ontologies or "ontics" (Law 2007). Encompassing the work of French sociologists Bruno Latour, Michel Callon, Volonona Rabeharisoa and Madeleine Akrich and a network of scholars across Europe, Australia and the US including John Law, Annemarie Mol, Helen Verran, Donna Haraway, Dick Willems and many others, post-ANT STS explores the ways in which technoscience performs ontologies, literally enacting bodies and worlds in ongoing, situated engagements of human and other-than-humans.

In this chapter, instead of figuring (feminist) STS as one foundation of the post-humanities as both Braidotti and Åsberg et al. do, I describe a number of dynamics between these two conceptual clusters. Risking misleading unifications, I use the categories '(feminist) STS' and 'the post-humanities' to trace a somewhat different set of dynamics than those celebrated in the Åsberg et al. quote. Sometimes, as I shall show, STS scholars engage in friendly dialogue with post-humanists; sometimes they belong to both groups; and sometimes there is friction and irritation between them. My intention in telling this story differently (Hemmings 2011) is to highlight conceptual and methodological trends that divide and connect forms of feminist work and that could synergise areas of strength.

Some feminist post-humanist scholars mine STS writing for conceptual inspiration. Donna Haraway's oeuvre, as Åsberg et al. state, is probably most significant here, and both Rosi Braidotti and Karen Barad are in ongoing conceptual dialogue with Haraway in their well-known books. Non-feminist STS is less frequently cited in feminist post-humanist work. In *Quantum Anthropologies*, however, Vicki Kirby (2011) undertakes a detailed reading of Latour's analysis of Nature and Culture (2004), comparing his views with Judith Butler's account in *Bodies That Matter* (1993). Intrigued by Latour's insistence on the significance of Nature as articulate, communicative and active, Kirby argues that ultimately – like Butler – he maintains an unnecessary division or disjuncture between Nature and Culture albeit, in Latour's case, one that involves "many little bridges of cooperation" (Kirby 2011, 88). Kirby prefers a model in which Nature and Culture are one; the "same force field of articulation, reinvention, and frisson" (Kirby 2011, 88). Latour, like Butler, does not end up helping Kirby much: rather than rethinking the relationship between Nature and Culture as both Latour and Butler do, Kirby wants to "radically reconceptualise Nature 'altogether,'" to understand it as 'a plenitude of possibilities, a cacophony of convers(at)ion' (2011, 88).

Braidotti describes STS as one of three major strands of post-human thought, but finds the field lacking both in relation to theorising subjectivity and to understanding contemporary politics (2013, 37–45). Most STS work aims, she argues, "to achieve a better, more thorough and in some ways intimate ethnographic understanding of how these new technologies actually function," but in her view, this aim evidences a "high degree of political neutrality" (2013, 42). Many STS scholars would dispute this claim, arguing that the articulation of technologies' functioning is part of engaging in a politics that does not jump to conclusions about the goods and bads of particular sociotechnical arrangements and that understands technologies as themselves materialising politics and social values. Latour's work on nature and the "parliament of things," for example, is explicitly focussed on the political, despite deliberately eschewing discourses and orientations traditionally understood as such (for example, those pertaining to class or gender) (Latour 2004). Although STS scholars – Latour included, at least in his early ethnographic work – sometimes adopt a rather empiricist tone (which could be read as "neutral"), their explorations of sociotechnical systems are almost always undertaken with a view to contributing to political debates: about genomics, health and social care, the promotion of technological and informational systems as "solutions" to social problems. Much STS work is also oriented towards challenging mainstream understandings of agency and action, looking to explore how non-human actors such as technologies, animals, and biological entities such as hormones, genes and microbes might be conceived as active. This is, as many post-humanities scholars would agree, an essentially political project.

Braidotti is right, however, to claim that most STS work attempts to articulate a detailed (often, although not always, ethnographic) description of how technoscience works. Indeed, the most significant orientation of STS is arguably its claim that technoscience *is* work – a set of practices or actions in which networks of human and other-than-human entities come into relation. For STS scholars, technoscience-as-practice does not describe a pre-existing world but enacts bodies and worlds, some of which seem more solid and others more fluid, but all of which are temporary and situated in time and place. STS methods, then, as John Law (2004) explains, track practices: of laboratory work, writing, field research, clinical treatments, policy-making, measuring, tabulating, coding, publishing and advertising, analysing how and where objects, subjects and relations are made. STS research, like technoscience itself, is understood as a form of bricolage or tinkering – an interested engagement often involving interference and/or direct encounter with, for example, animals, cells, codes, surgical operations.

Perhaps because of its more direct engagement with sexual politics but also with academic work in cultural studies, anthropology and history (McNeil and Roberts 2011), *feminist* STS (FTS) tends to be more eclectic and diverse in its methods and fields of study. Haraway leads the way in opening up what counts as "techoscience," including cultural texts such as advertisements, cartoons, museum displays, films and novels in her analyses. I follow Haraway's example in my work on sex hormones and sexual development, moving across a range of texts and practices including scientific photography, vlogging, sex education, environmentalist campaigning

and clinical practice as well as formal scientific publishing (Roberts 2007, 2015). In mainstream STS terms, such a wide range risks excessive distance from practice and too little specificity and precision. For me, such risks are justified by the possibilities of studying the movements and flows of scientific concepts and practices across times, spaces and genres. Exploring how hormonal understandings of sex travel and are mobilised by different actors helps me to bring feminist politics into conversation with an analysis of technoscience in an explicit way.

Post-humanities scholars, as evidenced in this volume, have strong skills in the analysis of written and visual cultural texts. Many, therefore, access technoscience through cultural forms such as novels and film. Stacy Alaimo's analysis of "science, environment, and the material self," for example, draws on science fiction novels, memoirs, documentary film and photography, poetry and popular environmentalist accounts in elaborating her notion of trans-corporeality (Alaimo 2010). Sometimes also referring to technoscientific texts, her analysis focuses on how the trans-corporealities of bodies and environments are experienced through and with various scientific framings: multiple chemical sensitivities, x-rays, cancer.

Exploring the contradictions and multiplicities of technoscientific accounts, Alaimo provides us with an excellent example of how to render and analyse scientific information as mediated. But how might post-humanities scholars engage with the more formal aspects of technoscience such as technical publications or laboratory and clinical practices? In an analysis of cancer memoirs, Alaimo makes a pertinent criticism of Zillah Eistenstein's *Manmade Breast Cancers* (2010). Although praising the book, Alaimo notes:

> Eisenstein does not mark the difficulties of becoming an ordinary expert in a risk society. We don't see her wading through popular journalism, medical textbooks, epidemiological data, biochemistry handbooks, or other scientific studies. The scientific information is rendered as immediate, as close at hand, as the traditional materials for autobiographical consideration (2010, 97).

Alaimo's point – that highlighting the difficulties and messiness of a lay person's encounters would result in a more compelling account – supports the development of my overall argument here. Many STS scholars, I want to suggest, engage with this messiness, doing an academic version of the "wading" Alaimo finds missing in Eisenstein's text.

Sociologist Nikolas Rose suggests that "when those from the social and human sciences do turn to biology, there is an understandable tendency to draw upon books about the life sciences written for non-specialists, and to select those themes that match their theoretical or political aspirations" (2013, 4). This tendency is present in post-humanist work that relies on popular published accounts of technoscience rather than engaging in depth with scientific publication or research. Braidotti's is a case in point: the bibliography of *The Posthuman* only cites two (highly popular) scientific publications, and when she describes contemporary robotics her source is an article in *The Economist*. As Rose suggests, this tendency is understandable: grappling with technoscientific literatures and practices is time-consuming and often both practically and intellectually challenging. It is enormously demanding to keep

up with one's own field of expertise (feminist post-humanist theory for example), without also attempting to keep track of genomics, sex endocrinology or any particular branches of neuroscience or informatics. Extreme specialisation and prolific publishing are calling cards of contemporary technoscientific fields, with "the literature" in any one field now "something far larger than anyone can digest" (Kelty and Landecker 2009, 177). This is where the detailed engagements undertaken within STS can make valuable contributions to post-humanities scholarship by providing detailed and nuanced accounts of technoscience. As argued above, such accounts are always political: even when employing a relatively neutral tone, STS scholars are explicit about their choices about what to read or empirically follow.

In a moment of irritation, STS theorist Annemarie Mol (2013) contends that recent theoretical debates about the non-human (parsed here as "new materialism") evidence a naïve relation to technoscience and to ontics. Interestingly, her criticism aligns with Kirby's assessment of Latour that he ultimately figures Nature as pre-existing:

> Like that of the canon, *their* 'ontology' is stable and singular – but it is *not* out of reach. They say that we should (finally!) stop fussing about language and interpretations and attend to the activities of matter itself – in its ontological essence (e.g. Coole and Frost, 2010). What they lightly skip over, though, is that matter never is 'itself' all by itself. Even when it is not being interpreted, matter is never alone. For it may well be that matter acts, but what it is able to *do* inevitably depends on adjacent matter that it may do something *with*. Action is always interaction. And it is only in interactions, or intra-actions if you prefer (Barad, 2007), that objects relationally afford each other their (always local, often fluid) 'essence'. As the new materialism forgets these relational engagements and affordances it has no way of talking about what matter 'itself' does, other than naively echoing natural science textbooks and journal articles – minus the materials and methods sections. Decades of work in STS is being disdainfully discarded (2013, 318).

The symmetry between this criticism of new materialism and Kirby's analysis of Latour is fascinating and seems to me to indicate a much closer alignment between at least some post-humanist feminist philosophy and STS than the methodological gap Mol so mercilessly exposes would suggest. Optimistically, then, I believe strengthening bonds between STS and post-humanities scholarship will invigorate debate, both conceptually and in terms of thinking critically about the nature of technoscience and how to engage with "it." To summarise, (post)humanities scholars have much to offer in the close analysis of texts; STS scholars have much to offer in their empirical pursuit and articulation of technoscience in action.

Part Two

In notable contrast to STS accounts, figurations of technoscience in many post-humanities texts are positive and excited in tone: as Astrida Neimanis writes in this volume, "Posthuman understandings of bodies […] can be generally understood to *embrace* scientific knowledge in ways that invite a view of bodies as operating on different interpermeating registers, from the biological or chemical

to the technological, social, political and ethical" (Neimanis, this volume; emphasis added). Indeed, there seems to be almost an obligation to situate oneself as "for" rather than "against" technoscience (see also Frost 2014). It would be hard to find a meaningful context for such a distinction within STS debates; indeed, the evaluative opposition mobilised here has been thoroughly challenged by STS scholars. In contrast, the post-humanist positioning often goes hand-in-hand with an affirmation of hope, love and/or joy and a positive orientation towards the future, despite a keen appreciation of contemporary environmental concerns and global politics (see, for example Grosz 2005; Colebrook 2012, 2014). Braidotti writes, for example:

> Being rather technophilic myself, I am quite upbeat. I will always side firmly with the liberatory and even transgressive potential of these technologies, against those who attempt to index them to either a predictable conservative profile, or to a profit-oriented system that fosters and inflates individualism (2013, 58).

She is similarly upbeat about 'our' collective capacity to ride the storm of current events, writing in *The Posthuman* that:

> This book rests on the firm belief that we, early third millennium posthuman subjects in our multiple and differential locations, are perfectly capable of rising to the challenge of our times, provided we make it into a collective endeavour and joint project (2013, 196).

STS accounts in contrast, tend to be more sceptical about both hope and the future; in part because of the entwinement of cultural discourses of hope with problematic figurations of technoscientific progress (Brown 2003; Adams et al. 2009; McNeil 2010; Roberts 2010). Hope in STS is a subject of critical analysis rather than a political category to occupy. This is not to say that STS does not articulate visions of alternative technoscientic futures: leading scholars such as Latour, Haraway, Law and Mol provide accounts of how humans and other-than-humans might relate in ways that cause less suffering and destruction.

Post-humanities' positivity about technoscience and technoscientific futures is a response to critical philosophical and cultural traditions that warn of the dangers of contemporary technologies and recent shifts towards the scientifisation of thought and the dangers this poses for human and non-human life. Alaimo cites Slavoj Žižek as exemplifying – indeed relishing – this negative approach. In his *Living in the End Times* (2011), Alaimo argues, Žižek rather triumphantly damns others' attempts to mitigate environmental disaster by practices of recycling or reducing energy consumption. Such activities are, in his view, a form of whistling in the dark – feeble attempts to deny the ecological disaster humans currently face (Alaimo 2012, 561–564). In an STS-style move, Alaimo suggests that focussing on practice opens up space between these polarised positions:

> Between Braidotti's humble yet utopian sense of transformation and Žižek's impotent activities of disavowal dwell the less exuberant and less certain practices of environmental-justice and environmental-health activists and amateur practitioners who recognise that their own bodily existence is caught up in material agencies that are difficult to discern and often impossible to escape (2012, 561).

In my own work on sexual development and sex hormones, I similarly try to resist the polar pulls of negativity and positivity. Thinking critically about the ways in which early sexual development is produced as a biological and cultural crisis, I both investigate and take seriously claims about the harms posed by early development and resist figurations of (early developing) female sexuality as inherently risky (Roberts 2015). In contrast to more speculative, autobiographical accounts of hormonal encounters – most notably Paul B. Preciado's ecstatic *Testojunkie* (2013) – I work rather systematically through a range of historical and contemporary technoscientific, biomedical and popular accounts of early onset puberty in order to explore figurations of hormones as actors in sexually developing bodies. This is neither an anti-science project nor one that celebrates the pharmacological possibilities of hormonal control. Instead, I theorise the complexities of sexual development as bio-psycho-social: technoscientific accounts are an important element of contemporary figurations of puberty and need to be explored in an open yet critically poised way.

Post-humanities scholars' emphasis on positivity also has a lineage in Deleuzian thought, as many have explained (see e.g. Colebrook 2014). Braidotti's posthuman ethics, like Haraway's famous statement "I would rather be a cyborg than a Goddess" (Haraway 1991), avoids clinging to traditional categories of purity (goddesses or Nature) or alignment with the politics of doom espoused by Žižek. In these debates, Judith Butler and other psychoanalytically-informed feminist theorists are repeatedly figured as holding an opposing view, as my earlier discussion of Kirby indicates. For Barad, Colebrook and Braidotti, Butler represents a negative or melancholic feminist stance that holds feminism back from hopeful embrace of the future (see also Hemmings 2014). In a meticulously generous essay in Blaagaard and van der Tuin's festschrift for Braidotti, Butler engages directly with this complaint, trying to articulate her requisite concerns with Braidotti's post-human ethics (Blaagaard and Tuin 2014). Acknowledging that she and Braidotti "come from different strands of poststructuralism and have quarrelled a little about sexual difference and melancholy" (Butler 2014, 22), Butler writes – uncontroversially I assume – of the inevitability of disagreements, even trouble, between feminist theorists. Her question to Braidotti and others in her "strand" is this:

> But how, then, do we think of these affective intensities, even conflicts (indignation, outrage, rejection), that nevertheless work in the service of the kind of ethics she promotes? I believe that they can, but this means we have to find a way of thinking about them as implicitly or potentially affirmative. What we need to ask, then, is this: Is that different from the affirmative response that counters such forms of destructiveness, or shall we say that, in some sense, both claims are true? (2014, 27).

Interestingly for my argument about STS, the example Butler offers to explore this concerns medical technology:

> I am looking for a philosophy of life in Braidotti that would include the enraged and destructive dimensions of life. What if the machine that keeps a disabled person alive or mobile is something she requires, and the machine, the technology is at once an object of

> gratitude and resentment; the machine may be a kind of object-friend one cannot do without and which, for that very reason, might be the occasion of anger, frustration and grief. The interdependency is there between human and machine, and it works in the service of life, but it does not, for that reason, become a relationship free of difficult passions. Can this ambivalent or multivalent affective intensity be part of what Braidotti calls sustainable becoming or relational vitality? (2014, 27).

Butler's debt to psychoanalysis is clear here. Her analysis of what a disabled person's relation to a life-sustaining technology might be relies on Melanie Klein's theorisation of the centrality of ambivalence in human psyches (Butler 2014, 26). For Klein, positive and negative affects – love and hate – are a conjoined experience or pattern; two sides of the same relational coin (Lewis 2014; Stacey 2014). Following Klein, Butler argues that "we cannot find relationality without an implicit operation of destructiveness" (Butler 2014, 26) and that feminism must find a way of working both with hopeful and angry or despairing relations. In a similar argument, Robyn Wiegman (2014) suggests that dichotomising "paranoid" and "reparative" readings of texts – as is common within recent feminist humanities scholarship – misunderstands Klein's theorisation of ambivalence, despite using her terms (Wiegman traces the genealogy of these terms through the work of Eve Kosofsky Sedgwick). For Wiegman, as for Butler, Klein helps us to understand that asserting the value of positivity cannot banish negativity or destructiveness. "The widely heralded distinction" between paranoid and reparative readings, Wiegman writes, "is not really one, as both practices are engaged in producing, confirming, and sustaining critical practice as a necessary agency, no matter the different object relations and analytic itineraries that govern each" (Wiegman 2014, 18). Jackie Stacey takes this further, arguing that Klein insists on our "necessarily *conflicted* relation to objects" (2014, 43) and thus that all reading practices are (and indeed should be) "*grounded in ambivalence*"(2014, 47).

Butler's brief example – of a disabled woman's possible ambivalence towards a technology that keeps her alive – is an intriguing one for my argument about the value of STS scholarship, for such ambivalence is a key concern in work on health and other technologies. In ethnographic work on wheelchairs, for example, French STS theorist Myriam Winance (2006, 2010) explores encounters between disabled people, physiotherapists and other carers and wheelchairs in clinical settings oriented towards fitting chairs to people. Paying ethnographic attention to the practices involved in these encounters, Winance finds that some users prefer to stick with older, less technologically-enabling chairs rather than to move on to "the latest." Her research articulates the deep ambivalence involved human/wheelchair relations; chairs that "fit" enact bodies in ways that are resistant to change. In typical post-ANT mode, Winance analyses these interactions as a form of collective that "tinkers" with bodies, technologies, sensations and meanings:

> In this case, care is not a relationship of assistance between an active carer and a passive care receiver, but a collective attention to the sensations and actions that emerge for the person in question; it is an attention to the nature of the relationship that develops between the person and the chair, and, more broadly, to the nature of the relationships that exist within the collective (2010, 105).

The best "fit" then, between a person and a wheelchair is an arrangement "in which humans and non-humans can work together, organise themselves and *live together*. The most suitable arrangement" Winance concludes, "is always a compromise, a source of abilities and disabilities, source of movement for all concerned" (2010, 110–111).

In similar work on technologies of care for older people living at home (bodily and environmental sensors and alarms), STS colleagues and I have explored, using ethnography and Citizens' Panels, "users" experiences and thoughts about both "pieces of kit" and the wider telecare systems of which these are part (Milligan et al. 2011; Roberts et al. 2012; Mort et al. 2013; Sánchez-Criado et al. 2014). Whilst some older people reported that technologies such as pendant alarms helped them to feel capable and safe – that it was ok, for example, to climb a stepladder or venture out into the garden – others expressed deep-felt resistance to the idea of being monitored by their adult children or by monitoring centre staff via these technologies and associated computer interfaces. Feelings of ambivalence were widespread: the promise that new technologies could foster safety and independence was both appreciated and treated with caution. Research participants, including older people, carers and professionals, raised complex questions including: what would the installation of these technologies in one's home mean for the provision of hands-on care? Are governments and care organisations promoting these technologies so they can reduce expenditure on care? Does wearing a pendant alarm make you old? And how might one establish meaningful, supportive relations with monitoring centre staff so that monitoring does not feel like oppressive surveillance?

In other work on genomics and pre-natal testing, Sarah Franklin and I (2006) explored the ambivalent relation would-be parents had to the highly technical and physically and emotionally demanding practices of the making and genetic testing of embryos within IVF cycles, known as preimplantation genetic diagnosis (PGD). Such tests, offered to couples with a high risk of conceiving a child with a serious genetic disease, were viewed as both a welcome relief (a chance to avoid repeated suffering such as miscarriage or the death of a young child) and a heavy burden, particularly when the seemingly inevitable uncertainties and failures involved in engaging with this treatment began to unfold. Although a remarkable testament to complex and skilled scientific and clinical work, PGD appeared ethnographically as riddled with challenges and problems: most of the patients we spoke to left treatment without having had a baby whilst in the programme. This failure, however, did not mean that their experience was entirely negative, or even that they were going to give up trying to have a child. Rather than a disappointment, the uncertainties involved in PGD – when explained openly by clinicians and scientists – were experienced as an important part of treatment:

> The place of sustained, critical, open questioning in such an equation thus becomes empowering and a sign of trust, rather than being unsettling or indicative of a lack of trust. Ambivalence also acquires a more positive connotation, as uncertainty and equivocation are means to explore the multiple possibilities out of which a 'best course forward' will be chosen (Franklin and Roberts 2006, 205).

STS research provides routes into thinking about ambivalence about technologies and technoscientific and biomedical knowledges and practices. As such, STS could prove valuable to post-humanities scholars in opening up paths between optimism and despair that avoid "wishing away ambivalence" (Stacey 2014). What is significant here again is STS's attention to detailed exploration of practices, objects and relations and the mutual enactments, as Mol (2002) would phrase it, of subjects and objects. Referring to Barad's (2007) concept of "agential cuts" (in which humans and other-than-human come into being within particular apparatuses), feminist STS scholar Lucy Suchman puts it like this:

> Our best hope for avoiding the twin traps of categorical essentialism and the erasure of differences that matter is to attend closely to just how human–nonhuman relations are figured, including their genealogies, legacies, and the distributions effected through particular cuts (2011, 137).

Conclusion

STS and post-humanities scholarship have much in common. Fascinated by contemporary technoscience and biomedicine, both fields recognise and highlight the importance of technoscience to understandings of Life, the Human, and to developing what earlier feminist theorists called the ethics of difference. Post-humanities scholars have much to offer STS through their skills in textual analysis of all forms and their careful elaboration of theoretical concepts. Conversely, as I have argued in more detail here, STS, and particularly FTS, provides a rich seam of empirical and conceptual work on technoscience for post-humanities scholars to mine, particularly when considering ambivalence. Continued cross-fertilisation between the two fields, then, should produce valuable new hybrids in the ongoing unfoldings of post-human naturecultures.

Acknowledgements I would like to thank Maureen McNeil, Jackie Stacey, Adrian Mackenzie and this volume's editors for their feedback on earlier drafts of this chapter.

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Chapter 18
The Fabrication of a New Materialisms Researcher Subjectivity

Hillevi Lenz Taguchi

Introduction

The purpose of this paper is to explore how to think about researcher subjectivity in another way informed by the feminist posthumanist philosophies of Rosi Braidotti, Claire Colebrook, Isabelle Stengers and the philosophy of Gilles Deleuze and Felix Guattari. In contrast to subjectivity understood in the feminist poststructural sense as performative and discursively inscribed, researchers doing what presently is understood in terms of *New Materialisms* research (Åsberg *et al*. 2011; Dolphijn and van der Tuin 2012) can be seen to fabricate for themselves affectively engaged *Bodies without Organs* (BwOs) (Deleuze and Guattari 1987). Colebrook writes that the figuration of the BwO is counter-normative in relation to dominating views of subjectivity (2014, 23). It offers a reversal of the taken for granted organicist idea that bodies take on a function to become what they are meant to be in relation to a whole. Instead, a Body *without* Organs suggests that there can be a body *without* functional parts, which in contrast to an organist idea is productive instead of performative movements and functions on an immanent plane of relations stretching into the future. In a machinic fashion, these movements and functions perform a body assemblage that can never take on a final or definite wholeness.

Moreover, this kind of body is organized by and draws from a larger, extensive machinic assemblage, involving relations between a multitude of material, semiotic (discursive) and social desiring forces inherent to – in this case – educational systems and institutional architecture and infra-structures, research policies, academic praxis and research practices, just to give some examples. Deleuze and Guattari describe the BwO as one side (or productive characteristic) of such a larger machinic assemblage (1987, 4). The other side is continually attempting to

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_18

dismantle and break out of the hierarchizing and normalizing strata that the assemblage organism is constructed by. This is no easy process, but rather a sometimes dangerous swinging between stagnated and normalizing practices, and dangerous leaps of escape into unknown destratified territories. This process will inevitably transform the BwO as to become productive of *differing* or *difference in itself;* that is, neither something better nor something worse in relation to something else, but continuous and ongoing internal differentiation (Deleuze 1994, 47; Dolphijn and van der Tuin 2012, 14; Colebrook 2014, 47).

Braidotti writes on this creative process of the BwO in terms of a philosophical nomadism (2006, 145). Braidotti's feminist figuration of the nomad was developed already in the 1990s as an alternative to a diasporic, homeless or compulsively displaced subjectivity, which "has relinquished all idea, desire, or nostalgia for fixity" (1994, 22). Rather, the subjectivity of the intellectual or researcher nomad is produced in an ongoing process of transition; in successive shifts in coordinated, rhythmical changes and movements inbetween repetitive and already well-treaded paths and territories. A philosophical nomadism and nomadic subjectivity institutes the intermezzo and the vector of deterritorialization (1994, 23). Thus, as a feminist nomad, says Braidotti, it leaves behind the linear mode of thinking, in order to enable a rhizomatic thinking inbetween and as, in, and from, a minority position (1994, 29).

The question explored for this chapter concerns what desiring material, semiotic and social flows that might pass on and constitute a New Materialist researcher BwO, drawing from a larger extensive machinic assemblage of higher education and university research practices in the situated space of a postgraduate coursework on deconstruction. In line with the above, neither this machinic research assemblage, nor the researcher her/him-self constitutes an agent that *has* agency in this relation. Rather, agency is what gets produced in the connections and relations of the machinic assemblage. Hence, the assemblage is productive of distributed agency and can be described as an entanglement of relational agents and as a collective *Voice without Organs* (Mazzei 2013, 733). It organizes itself as a knot of forces and intensities that operate on a plane of immanence producing impersonal collective "voices" that do not emanate from singular subjects (2013, 734). This can be understood in terms of a process of *becoming-imperceptible*, to use another of Deleuze and Guattari's (1987, 187) concepts. Braidotti writes that becoming-imperceptible is about "merging with one's environment" in a process of differentiation and becoming (2006, 260). She also describes it as an affirmative force and power of *potential*: the not yet realized potentialities of the virtual (2013, 138). To continue, in Braidotti's theorizing becoming-imperceptible makes possible a letting go of "institutionalized accumulation of experiences whose authority is sealed by molar or dominant memory and the identities it engenders" (2006, 260), in order to plunge instead into the affirmative present of the event. In the case of this chapter, such an event was doing collaborative research analysis in postgraduate coursework. It is in such events that it becomes possible for us to fabricate those impersonal collective researcher *Bodies without Organs*, and become, as Deleuze and Guattari write, mere "tools for thinking," since, as they add, "it is thought itself that requires the thinker" (1994, 69).

But what are the desiring forces that make us want to fabricate for ourselves a BwO as an impersonal and imperceptible tool for thinking? Below, I will briefly outline my previous research in the territory of materializing post-structuralism as research practice, and discuss some of the genealogical routes taken during the process of a 7-month postgraduate coursework on deconstruction (Lenz Taguchi 2012, 2013a, 2013b). For this chapter, I have limited the discussion to show how the desiring forces of *The Production of Multiple Ontologies* and *The Affective (researching) Body* became productive of some of the movements of deterritorialization pursued in a process that would eventually fabricate what I understand as a New Materialisms researcher BwO. I will illustrate the swinging movements in the fabrication of this researcher BwO, between practicing what Deleuze and Guattari (1987) have called a classical root-book thinking and a rhizomatic thinking, as well as swinging between pleasure and pain: doing analysis drawing uncomfortably near an "act of violence" and, on the other hand, getting close to a gratifying act of "love-making." The aim of this narrative is to illustrate of some of the important implications of New Materialisms research.

Positionings

In order to further position the particular problem of this chapter, I want to present an imagery of two kinds of eggs. Firstly, the egg of Diderot's *enchanted materialism*, which links rationalism directly to imagination, as Braidotti says (in Dolphijn and van der Tuin 2011, 28). Secondly, Deleuze and Guattari's simultaneously loving, mirthful and dangerously rebellious image of the *Body without Organs* as the *tantric egg* (1987, 153).

Deleuze and Guattari (1987) perform a humorous parallel between the BwO and the tantric meditative rituals, where matter, reality and emancipatory liberation are connected and pursued. Corresponding to the tantric emancipatory rituals, the BwO is a condition (not of an organism) but of a *doing* and "a component of *passage*": it is on a threshold, dismantling and transforming itself, in ways that might be creative but which might, at worst, become destructive (1987, 158). Hence, they exclaim: "Find your body without organs. Find out how to make it. It's a question of life or death" (1987, 151). Ultimately, it is a question of fabricating either a *full* creative and vitalizing BwO, balancing on the plane of consistency; or risking an *emptied* BwO, if swinging too far into centrifugal, decentering, dispersing discourses and practices (1987, 149–150). Hence, when we as researchers engage in decentering normative research practices and experiment to undertake what St. Pierre (2011) calls *postfoundational* qualitative inquiry, this can be seen as a creative possibility of "escaping forces of repression and stratification" that nevertheless risks becoming a dangerous endeavour if we do not watch out (Deleuze and Guattari 1987, 161).

So, what does the tantric egg have to do with what Isabelle Stengers (2007) discusses in terms of the challenge of Diderot's egg? When Diderot wrote the book

D'Alembert's Dream in 1769, he let himself ask D'Alembert, his contemporary mathematician: "Do you see this egg? With this you can topple every theological theory, every church or temple in the world." He does not ask D'Alembert to *observe* the egg, which would be in line with a scientific reductive mood of inquiry. Rather, says Stengers, he asks D'Alembert to accept *seeing* the egg, using other senses and sensibilities; imagining the developing embryo and the small chicken that will break the shell to come out (Stengers 2007, 4). So, what Diderot asks D'Alembert is "that he *give* to the egg *the power to challenge* his well-defined categories" (Stengers 2007, 4). Stengers concludes that Diderot asks D'Alembert to think about the egg *differently* and perform the double operation of, *at once*, having him "accept being affected, troubled, surprised, but also being forced to think and question his own knowledge" (Stengers 2007, 5) (see also Lenz Taguchi, 2016).

Relating back to the BwO, Diderot's challenge is quite similar to the technique or practice of what the fabricating of a BwO might entail: pushing yourself to a limit, in a state of passage on a threshold, in order to dismantle and transform the thinking and practicing that constitute your research practices. Deleuze and Guattari could have described the operation required of D'Alembert as a state of "swinging" between habitual ways of thinking and ways that might set them free:

> This is how it should be done: Lodge yourself on a stratum, experiment with the opportunities it offers, find an advantageous place on it, find potential movements of deterritorialization, possible lines of flight, experience them, produce flow conjunctions here and there, try out continuums of intensities segment by segment, have a small plot of new land at all times… (1987, 161)

What they are saying here is that the fabricating of a BwO is a practice of *de*territorializing and territorializing: i.e. making yourself new territories of thinking and doing by ways of engaging in potential movements of *de*territorialization. You can, however, never reach a finished state or stable territory. This is because the BwO is, by definition, an endless *becoming* of continually constructing itself (1987, 164): "you can't reach it, you are forever attaining it, it is a limit" (1987, 150). What Deleuze and Guattari urge us to do is to activate a movement of going to the limit by challenging the strata that are an inevitable aspect of the machinic assemblages that contain us and that we are co-productive of, while at the same time trying to stay balanced on a plane of consistency.

> We are in a social formation; first see how it is stratified for us and in us and at the place where we are; then descend from the strata to the deeper assemblage within which we are held; gently tip the assemblage, making it pass over to the side of the plane of consistency. It is only there that the BwO reveals itself for what it is: connection of desires, conjunction of flows, continuum of intensities. […] It is through a meticulous relation with the strata that one succeeds in freeing lines of flight, causing conjugated flows to pass and escape and bringing forth continuous intensities for a BwO (Deleuze and Guattari 1987, 161).

It is these strata that organize and articulate us as signified organisms and as subjects of collective enunciations: we are both signified and signifier, interpreter and interpreted (1987, 159). By performing a cautious transversal movement, and thus

descending from the strata to the depth of an assemblage of a greater chaotic multiplicity of desiring forces, we might succeed in escaping those coagulating lines of articulation and research practices that we habitually stick with and follow, in order to bring forth new vitalizing intensities for the researcher BwO. And it is these intensities that might help us to produce new kinds of knowledge in our research-practices. However, it is important to add Deleuze and Guattari's remark that "staying stratified – organized, signified, subjected – is not the worst that can happen; the worst that can happen is if you […] throw the strata into demented or suicidal collapse, which brings them back down us heavier than ever" (1987, 161). You need to have a meticulous relation to the segmented or cemented strata that you aspire to escape in the fabrication of your researcher BwO: "You don't do it with a sledgehammer, you use a very fine file," as Deleuze and Guattari conclude (1987, 160).

In this way you can see how and why these two eggs have become the main protagonists of the problem of this chapter. They both enact a double movement. On the one hand, we *have* to and *are* already, as New Materialist researchers, subjugated *and* aspiring to push ourselves to the limit of our research practices, in order to be productive of new kinds of knowing. On the other hand, we need to – following Diderot's challenge of the egg and Deleuze and Guattari's theorizing on the BwO – seriously explore the desires involved in the fabrication of our researching BwOs, in order to know and perhaps question what they become productive of.

In this movement of materializing poststructuralisms' practices, we turn to the concept of the inorganic BwO, to *get away* from the specificity of the discursively inscribed and performative organic body, as theorized by feminist poststructuralists (Braidotti 1994, 2006, 2012, 2013; Colebrook 2014). For us to know how the organic bodies of New Materialisms researchers might be produced, we need to know what is taking place on that inorganic plane of the researching BwO. That is, we need to know how this BwO is fabricated and what desiring moods might pass on it (Deleuze and Guattari 1987, 152).

The Desiring Forces of a New Materialist Researcher BwO

Let us now have a look at that drama of desiring-production in the enactment of research as we fabricate for ourselves that inorganic space of a researcher/-ing Body without Organs. Keep in mind the two images of the egg: Diderot's challenge of questioning established sets of research practices, as well as the swinging of the tantric egg; swinging between an enchanted liberation and the threats of self-destruction, balancing on a plane of consistency. In this section, I will show how two strong entangled desires were equally productive in what was eventually fabricated as a New Materialisms researching BwO: the desire for *Productions of Multiple Ontologies* and the desire for *an Affective (researching) Body*. These desires are of a material, social and semiotic (discursive) kind, and thus enunciate and materialize practices of doing New Materialisms research.

A Course on Experimental Collaborative Deconstruction

What happened in the events of this example, featuring a postgraduate coursework during seven months in 2005 and 2006, can be understood to be driven by a much sought after desire amongst New Materialist researchers to turn to issues of ontology and the realization of reality understood in terms of multiple ontologies. However, desiring the production of multiple ontologies in the experimentation with each other's data in the coursework presented below should rather be understood as the unexpected side-effect of a *feminist poststructural* desire to perform collaborative deconstructive work on each other's data with the aim to get away from the taken for granted researching "I" (St. Pierre 2011). This practice, inspired by educational feminist researchers such as Patti Lather, Bettie St. Pierre, Maggie MacLure and Bronwyn Davies, evolved from the desire of knowing differently, and getting away from interpretation and representation by experimenting with collaborative practices of deconstruction. This engagement eventually brought about a desire of getting out of the discursive closure that lures within deconstruction (Lenz Taguchi 2013b, 1108). We desired to ride instead on the *lines of flight*, in order to be productive of new realities with(in) the data. By the end of this process, we came to experience what I many years later would relate to Deleuze and Guattari's idea of a *rhizomatic image of thought* and write about as feminist researchers *becoming-molecular girls* as part of a *collective-researcher-assemblage* (Lenz Taguchi 2013a, 2013b).

We began this collaborative endeavour by attempting to deconstruct our various take-ups of Derrida's and other's texts on deconstruction. The idea was first and foremost to make ourselves aware of the epistemological presuppositions that our respective take-ups relied on, as we battled with trying to make sense of deconstruction. Talking with Deleuze and Guattari (1987), we started the swinging between established sets of strata to find potential movements of deterritorialization, and trying to reach that state of passage where we might think differently about our own thinking. Although this work actually helped disclose our discursive toolboxes and unhinged our taken for granted thinking, this process would prove to still rely anxiously on an assumed rational and self-reflexive mind, trying to trace her/his thinking, in order to understand or *interpret* what deconstruction ("really") is (Lenz Taguchi 2013a, 708). Moreover, this process was driven by a poststructural desire to make multiple readings of various positionings in the data. At worst, these readings can be understood as different reflections of reality whilst the original meaning remains within the text, of, for example Derrida's *Of Grammatology*. As the texts produced different understandings of deconstruction in the participants' readings of them, this would merely unmask how the participants were discursively inscribed in different ways, while the *original* meaning lies within the text itself (Lenz Taguchi 2013a, 708). This desire might then become productive of what Deleuze and Guattari (1987, 5) call a tree-like "root-book" thinking. The text remains an imitation or reflection of the original idea or ideal that emanates from the root.

Moving into the next phase of the coursework, we started to experiment with doing collaborative deconstructive analysis of the data in smaller groups. We desired to get away from both root-book understandings of deconstruction and of representing various positionings in the data to, instead, be productive of other possible realities. However, engaging in these processes of deconstructing each other's data was, at first, quite painstaking. We tiptoed around the data, focusing on how the body-subjects in the data made meaning of their respective lifeworlds as described in interview transcripts or narrative data. Hence, contrary to what we aspired to do, we activated what Nikki Sullivan so tellingly has called a *somatechnics* analysis (2012, 300), where we made meaning of how something is made intelligible *for* a specific thinking "I/eye" in the data (Lenz Taguchi 2013a, 711). Although we did not search for the original meaning of that subject in the data, we ended up sorting, bundling and categorizing multiple root-threads of similar firsthand life-world experiences of human subjects in the data, desiring to interpret how to know this subject.

Deleuze and Guattari refer to this kind of thinking as a fascicular root-thinking and a classical phenomenological ontology. They write: "The principal root is aborted, or its tip has been destroyed" (1987, 5). Nevertheless, "the fascicular system does not break with dualism, with the complementarity between the subject and an object, a natural reality and a spiritual reality: unity is consistently thwarted and obstructed in the object, while a new type of unity triumphs in the subject" (1987, 6). Hence, the unity is restored in the Subject's interpretive control of a chaotic multiplicity of lifeworld experiences (Lenz Taguchi 2013a, 711). Fascicular root-thinking thus fabricates a researching BwO engaged in a process where the researching "I/eye" inevitably pre-exists its relations to the world, as it stretches itself towards a material world given *to* it and for *it* to be perceived and experienced (Lenz Taguchi 2013a, 711). Therefore, the BwO we managed to fabricate for ourselves in this part of the coursework still relied on molar lines of articulation that lead to segmentation and binary constructions (Deleuze and Guattari 1987, 5–6). We did not dare to swing this BwO out onto *a line of flight*, in order to escape the forces of what can be seen as repression and stratification of a latent Cartesianism (Cutler and MacKenzie 2011, 64).

Getting caught in fascicular root-thinking can be related to what Stengers (2007, 4) warns us about in story of Diderot's egg, about not getting caught in a fight between two idealist temptations. This is a fight between a theology with God as the author of the miracle of the egg, in terms of a reductive humanism metaphysics; and a science which refuses the challenge of the egg in the name of its own restricted and reductive definitions (Stengers 2007). Whichever way we go, we remain in the idealist attitude of finding the one best research practice and explaining away that which complicates our judgments (ibid., 5). This would mean, Stengers continues, granting a specific idea or research practice the power to separate, silence and disqualify other ideas or practices (2007, 4). Correspondingly, fascicular root-thinking pertains to a humanism metaphysics and a negative ontology that is bound to establish difference as a difference that splits and separates, the "I" from "the Other" (Dolphijn and van der Tuin 2012; Braidotti 2013; Lenz Taguchi 2013a, 713; Colebrook 2014).

So, how would it eventually be possible for us to fabricate a researcher BwO that would actually dismantle normalizing ideas of thinking and instead let "asignifying particles or pure intensities to pass or circulate" on it (Deleuze and Guattari 1987, 4)? Well, we did not engage in the conscious act of questioning that Diderot asked D'Alembert to perform in order to dismantle and transform his taken for granted research practices. Rather, getting to what Deleuze and Guattari (1987) call *rhizomatic thinking* – which would also constitute a radical ontological shift from a transcendental to an immanent and relational ontology – was rather a process of what Lather (2007) would call *getting lost*. It was in the very production of an endless amount of transcripts of analyses of each other's data and analyses, and *giving in* to the overwhelming diversity of these different readings that forced themselves upon us, which forced us into practices of rhizomatic thinking. Analyses seemed to grow wildly like weeds or grass around us. Hence, it was the superfluity and excess of readings that had us let go of and break out of habitual practices of root-thinking or fascicular root-thinking (Lenz Taguchi 2013a, 707). Instead we would engage in what Rick Dolphijn and Iris van der Tuin (2012, 85ff) have written about as a performativity of difference: a *transversal* practice of difference that cuts through a realist positivism as well as a social constructionist postmodernism in order to create something new. Inspired by Deleuze (1994, 222), difference then is *not* to be understood as diversity or a necessary othering of an unknowable Other – establishing a difference from. Rather, difference must be seen as a process or generative force – a *differences in itself* (1994, 144). It is this Deleuzian practice of *differing* that makes the desire to produce multiple ontologies possible, and becoming a conclusive desire in the fabrication of this new emergent researcher BwO.

It was in this this flow of multiple readings that it was possible to read the interview with a 6-year-old boy understood as a boy with "special needs," about his day by the stream making bark-boats, in terms of new productions of realities (Lenz Taguchi 2012, 273). Rather than tracing what emerges in the practice of analysis to a root of origin or essence, or trying to order the chaos of differences, by stacking them into bundles, themes, or categories in our analysis; we started *in the middle*, to look for what emerged in the connections between different fields and flows of the rhizome (Lenz Taguchi 2013a, 712). We made many possible readings and suggested multiple realities of the events by the stream. All of these readings, as different segmentary, or lines of flight, of the rhizome, were laid out as a "map". But this was not an ordinary map that truthfully represents a space. Instead, Deleuze and Guattari think of the map as a composition of different lines that is "detachable, connectable, reversible, modifiable, and has multiple entryways and exits and its own lines of flight. […] the rhizome [as such a 'map'] is an acentred, non-hierarchical, nonsignifying system" (1987, 21). Such a "map" does not concern itself with interpretation, meaning, and defining a body's limitations or form. Rather, it is on this map that the desiring force of the affective body is played out in the investigation of the various forces and intensities in the events of the data; as the different lines connect, intersect, or traverse each other and become productive of differing (Lenz Taguchi 2013a, 712).

Installing ourselves in the event *with* the boy, his classmates and the bark-boats by the stream, we were affected by the relations and interactions taking place between the boy, the boat and the stream, as the boy narrates the short voyage ending in what seemed to be a disaster. *Becoming-with-the-Child* and *Becoming-with-the-Bark-Boat* in the event of reading the data, can be understood as an affective transformative passing from one state of becoming to the other, as Deleuze and Guattari describe it; a sensation in a zone of indetermination (1994, 173). We installed ourselves in the data to imagine the intra-activity between the boy, the boat and the water in a relationship of non-hierarchical entangled intra-activities and co-dependences between human and more-than-human agents (Lenz Taguchi 2012, 276). In this way, the events unfold a reality of the boy's success in narration, creative imagination and intense collaboration between multiple intra-acting performative agents. In this reality, this boy is no longer a child at risk, lacking in social and emotional ability (Lenz Taguchi 2012). The desiring force of the affective body is activated when reading the data on the map in this way. Thinking and imagining in this process thus *exceeds* data and the researcher, to become productive of differing and thus of other possible realities (Deleuze and Guattari 1994, 164). The desiring forces of the affective body and the production of multiple ontologies are in this way intrinsically entangled.

The New Materialisms Researcher BwO

It was the enactment of rhizomatic thinking that made it possible for us to be creative of another possible reality in the interconnections between various desiring fields and flows in our different readings of the data. In the middle of this multiplicity, it was possible to, as Deleuze and Guattari (1987, 161) describe it, find potential movements of deterritorialization, and possible lines of flight. We would try out and be productive of conjunctions in this flow of readings and "have a new plot of land at times" (1987, 161), but never in order to claim a new normalizing territory of interpretive representations. It became, in this process, possible to *acenter* and *asubjectify* ourselves as individual researchers and fabricate a researcher reality of an inorganic BwO and what I have referred to as a *collective-researcher-assemblage* of multiple performative agents (Lenz Taguchi 2013b, 1109). We came to understand this decentered researcher reality in terms of a deep loading inter-connectedness and companionship with the various bodies involved in the process: our fellow researchers, the situatedness of the data, and the material-discursive situated places and spaces where this process was enacted and where these alternative realities were made possible (Lenz Taguchi 2013b, 1109).

However, the process of fabricating such a BwO constituted an anxious swinging between pleasure and pain. Writing and reading is, as Grosz notes, often just as much an "act of violence" as it is an "act of love-making" (2005, 190). This is because pleasure and pain are also the drives of force connected to "the will to power" (Grosz 2005, 191). Hence, the researcher BwO is found swinging between

a vitalist flourishing full BwO, as the intensity of a passionate "love-making" with another's data pass on the surface of the BwO, only to be replaced in the next instance by the intensity of a destructive "violation" of the data, while performing our analysis *on* it, to interpret *the* meaning of it, and thus fabricating an emptied BwO of pain and guilt (Lenz Taguchi 2013b, 1110–1111). Importantly, Grosz reminds us that we are not talking about an organic body-subject, nor a discursively inscribed subjectivity: rather, "this is not a subject that takes before it an object on which to enact its desire or will" (Grosz 2005, 189) […] "it is forces, *not subjects* which act and produce, which proliferate and transform, which are subjected to becoming and self overcoming", as Grosz concludes (2005, 193, italics added).

Conclusion

The New Materialism researcher BwO that we fabricated was driven by the desires of the affective body and the construction of multiple ontologies. This BwO claims practices of reading from the data other possible material-discursive realities. This, I would argue, constitutes a feminist resistance and subversiveness in the enactment of doing research analysis. It implies a resistance against foundational, anthropocentric and privileging points of view, to acknowledge our interdependence and coexistence with other minor bodies and matter in the world. What is produced as knowing in this kind of rhizomatic analysis thus constitutes a material-discursive reality, where that which has up till now been considered passive and minor (children, women, water, wind, bark-boats and other matter) is now seen as active and forceful in its intra-activities with other bodies (Lenz Taguchi 2012, 278).

As Stengers says, we need always to connect with struggle, in order to be productive of "other kinds of narratives, narratives that populate our worlds and imaginations in a different way" (2007, 2), and that are equally inhabited by the minor bodies and matters of the world. Stengers refers to the challenge of Diderot's egg in order to emphasize that this is about the production of alternative narratives that matter (Stengers 2007, 3). The alternative narrative of the egg that had the power to challenge by activating, "the power to wonder," which contains the double meaning of this word – *wondering* and *the wonder* (2007, 5). Hence, says Stengers, it is the power to wonder that is important her: "the power to cause us to think, feel and wonder" (2007, 5). And equally important is the power *to have us wondering* how to construct relevant problems that provide relevant *other* ways of knowing as well as new imaginings. This, I would argue, is one most important implication of the still emergent New Materialist research.

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Chapter 19
Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter

Karen Barad

Language has been granted too much power. The linguistic turn, the semiotic turn, the interpretative turn, the cultural turn: it seems that at every turn lately every "thing" – even materiality – is turned into a matter of language or some other form of cultural representation. Language matters. Discourse matters. Culture matters. There is an important sense in which the only thing that does not seem to matter anymore is matter.

What compels the belief that we have a direct access to cultural representations and their content that we lack toward the things represented? How did language come to be more trustworthy than matter? Why are language and culture granted their own agency and historicity while matter is figured as passive and immutable, or at best inherits a potential for change derivatively from language and culture? How does one even go about inquiring after the material conditions that have led us to such a brute reversal of naturalist beliefs when materiality itself is always already figured within a linguistic domain as its condition of possibility?

[T]he representationalist belief in the power of words to mirror preexisting phenomena is the metaphysical substrate that supports social constructivist, as well as traditional realist, beliefs. Significantly, social constructivism has been the object of intense scrutiny within both feminist and science studies circles where considerable and informed dissatisfaction has been voiced.[1]

[1]Dissatisfaction surfaces in the literature in the 1980s. See, e.g., Donna Haraway's "Gender for a Marxist Dictionary: The Sexual Politics of a Word" (originally published 1987) and "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective" (originally published 1988); both reprinted in Haraway (1991). See also Butler (1989).

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1_19

A *performative* understanding of discursive practices challenges the representationalist belief in the power of words to represent preexisting things. The move toward performative alternatives shifts the focus from questions of correspondence between descriptions and reality to matters of practices/ doings/actions. I would argue that these approaches also bring to the forefront important questions of ontology, materiality, and agency, while social constructivist approaches get caught up in the geometrical optics of reflection where, much like the infinite play of images between two facing mirrors, the epistemological gets bounced back and forth, but nothing more is seen.

Moving away from the representationalist trap of geometrical optics, I shift the focus to physical optics, to questions of diffraction rather than reflection. Diffractively reading the insights of feminist and queer theory and science studies approaches through one another entails thinking the "social" and the "scientific" together in an illuminating way. What often appears as separate entities (and separate sets of concerns) with sharp edges does not actually entail a relation of absolute exteriority at all. Like the diffraction patterns illuminating the indefinite nature of boundaries – displaying shadows in "light" regions and bright spots in "dark" regions – the relation of the social and the scientific is a relation of "exteriority within." This is not a static relationality but a doing – the enactment of boundaries – that always entails constitutive exclusions and therefore requisite questions of accountability.[2] My aim is to contribute to efforts to sharpen the theoretical tool of performativity for science studies and feminist and queer theory endeavors alike, and to promote their mutual consideration. In this article, I offer an elaboration of performativity – a materialist, naturalist, and posthumanist elaboration – that allows matter its due as an active participant in the world's becoming, in its ongoing "intra-activity."[3] It is vitally important that we understand how matter matters.

[2]Haraway proposes the notion of diffraction as a metaphor for rethinking the geometry and optics of relationality:

> [F]eminist theorist Trinh Minh-ha … was looking for a way to figure 'difference' as a 'critical difference within,' and not as special taxonomic marks grounding difference as apartheid. … Diffraction 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 differences appear. (1992, 300)

Haraway (1997) promotes the notion of diffraction to a fourth semiotic category. Inspired by her suggestions for usefully deploying this rich and fascinating physical phenomenon to think about differences that matter, I further elaborate the notion of diffraction as a mutated critical tool of analysis (though not as a fourth semiotic category) in my forthcoming book (Barad 2007).

[3]See Rouse (2002) on rethinking naturalism. The neologism intra-activity is defined below.

From Representationalism to Performativity

The idea that beings exist as individuals with inherent attributes, anterior to their representation, is a metaphysical presupposition that underlies the belief in political, linguistic, and epistemological forms of representationalism. [R]epresentationalism is the belief in the ontological distinction between representations and that which they purport to represent; in particular, that which is represented is held to be independent of all practices of representing. This taken-for-granted ontological gap generates questions of the accuracy of representations. Representationalism has received significant challenge from feminists, poststructuralists, postcolonial and queer theorists.

The fact that representationalism has come under suspicion in the domain of science studies is less well known but of no less significance. Critical examination of representationalism did not emerge until the study of science shifted its focus from the nature and production of scientific knowledge to the study of the detailed dynamics of the actual practice of science. Ian Hacking's *Representing and Intervening* (1983) brought the question of the limitations of representationalist thinking about the nature of science to the forefront. Joseph Rouse (1996) has pointed out that […] both scientific realists and social constructivists believe that scientific knowledge mediates our access to the material world; where they differ is on the question of referent, whether scientific knowledge represents things in the world as they really are (i.e., "Nature") or "objects" that are the product of social activities (i.e., "Culture"), but both groups subscribe to representationalism.

Hacking traces the philosophical problem of representations to the Democritean dream of atoms and the void. With Democritus's atomic theory emerges the possibility of a gap between representations and represented. Atomism poses the question of which representation is real. Rouse identifies representationalism as a Cartesian by-product – a particularly inconspicuous consequence of the Cartesian division between "internal" and "external" that breaks along the line of the knowing subject (1996, 209). In other words, the asymmetrical faith in our access to representations over things is a contingent fact of history and not a logical necessity.

It is possible to develop coherent philosophical positions that deny that there are representations on the one hand and ontologically separate entities awaiting representation on the other. A performative understanding, which shifts the focus from linguistic representations to discursive practices, is one such alternative. Judith Butler's name is most often associated with the term *performativity* in feminist and queer theory circles. And while Andrew Pickering has been one of the very few science studies scholars to take ownership of this term, there is surely a sense in which science studies theorists such as Donna Haraway, Bruno Latour,

and Joseph Rouse also propound performative understandings of the nature of scientific practices.[4]

In this article, I propose a specifically posthumanist notion of performativity – one that incorporates important material and discursive, social and scientific, human and nonhuman, and natural and cultural factors. A *posthumanist* account calls into question the givenness of the differential categories of "human" and "nonhuman," examining the practices through which these differential boundaries are stabilized and destabilized.[5] If performativity is linked not only to the formation of the subject but also to the production of the matter of bodies, as Butler's account of "materialization" and Haraway's notion of "materialized refiguration" suggest, then it is important that we understand the nature of this production.[6]

Foucault's analytic of power links discursive practices to the materiality of the body. However, his account is constrained by several important factors that severely limit the potential of his analysis and Butler's performative elaboration, thereby forestalling an understanding of precisely *how* discursive practices produce material bodies. If Foucault, in queering Marx, positions the body as the locus of productive forces, the site where the large-scale organization of power links up with local practices, then it would seem that any robust theory of the materialization of bodies would necessarily take account of *how the body's materiality* – for example, its anatomy and physiology – *and other material forces actively matter to the processes of materialization*.

[4]Pickering (1995) explicitly eschews the representationalist idiom in favor of a performative idiom. It is important to note, however, that Pickering's notion of performativity would not be recognizable as such to poststructuralists, despite their shared embrace of performativity as a remedy to representationalism, and despite their shared rejection of humanism. Pickering's appropriation of the term does not include any acknowledgement of its politically important – arguably inherently queer – genealogy (see Sedgwick 1993) or why it has been and continues to be important to contemporary critical theorists, especially feminist and queer studies scholars/activists. Indeed, he evacuates its important political historicity along with many of its crucial insights. In particular, Pickering ignores important discursive dimensions, including questions of meaning, intelligibility, significance, identity formation, and power, which are central to poststructuralist invocations of "performativity." And he takes for granted the humanist notion of agency as a property of individual entities (such as humans, but also weather systems, scallops, and stereos), which poststructuralists problematize. On the other hand, poststructuralist approaches fail to take account of "nonhuman agency," which is a central focus of Pickering's account. See Barad (2007) for a more detailed discussion.

[5]This notion of posthumanism differs from Pickering's idiosyncratic assignment of a "posthumanist space [as] a space in which the human actors are still there but now inextricably entangled with the nonhuman, no longer at the center of the action calling the shots" (26). However, the decentering of the human is but one element of posthumanism. (Note that Pickering's notion of "entanglement" is explicitly epistemological, not ontological. What is at issue for him in dubbing his account "posthumanist" is the fact that it is attentive to the mutual accommodation, or responsiveness, of human and nonhuman agents.)

[6]It could be argued that "materialized refiguration" is an enterprised up (Haraway's term) version of "materialization," while the notion of "materialization" hints at a richer account of the former. Indeed, it is possible to read my posthumanist performative account along these lines, as a diffractive elaboration of Butler's and Haraway's crucial insights.

Foucault […] is not out to deny the relevance of the physical body but, on the contrary, to

> show how the deployments of power are directly connected to the body – to bodies, functions, physiological processes, sensations, and pleasure; far from the body having to be effaced, what is needed is to make it visible through an analysis in which the biological and the historical are not consecutive to one another … but are bound together in an increasingly complex fashion in accordance with the development of modern technologies of power that take life as their objective. (1980a, 151–2)

However, Foucault does not tell us in what way the biological and the historical are "bound together." For all Foucault's emphasis on the political anatomy of disciplinary power, he too fails to offer an account of the body's historicity in which its very materiality plays an *active* role in the workings of power. This implicit reinscription of matter's passivity is a mark of extant elements of representationalism that haunt his largely post-representationalist account.[7] This deficiency is importantly related to his failure to theorize the relationship between "discursive" and "nondiscursive" practices. As materialist feminist theorist Rosemary Hennessey insists in offering her critique of Foucault, "a rigorous materialist theory of the body cannot stop with the assertion that the body is always discursively constructed. It also needs to explain how the discursive construction of the body is related to nondiscursive practices in ways that vary widely from one social formation to another" (1993, 46).

Crucial to understanding the workings of power is an understanding of the nature of power in the fullness of its materiality. To restrict power's productivity to the limited domain of the "social," for example, or to figure matter as merely an end product rather than an active factor in further materializations, is to cheat matter out of the fullness of its capacity. How might we understand not only how human bodily contours are constituted through psychic processes but how even the very atoms that make up the biological body come to matter and, more generally, how matter makes itself felt? Surely it is the case – even when the focus is restricted to the materiality of "human" bodies – that there are "natural," not merely "social," forces that matter. Indeed, there is a host of material-discursive forces – including ones that get labeled "social," "cultural," "psychic," "economic," "natural," "physical," "biological," "geopolitical," and "geological" – that may be important to particular (entangled) processes of materialization. If we follow disciplinary habits of tracing disciplinary-defined causes through to the corresponding disciplinary-defined effects, we will miss all the crucial intra-actions among these forces that fly in the face of any specific set of disciplinary concerns.[8]

What is needed is a robust account of the materialization of *all* bodies – "human" and "nonhuman" – and the material-discursive practices by which their differential constitutions are marked. This will require an understanding of the nature of the relationship between discursive practices and material phenomena,

[7] See also Butler (1989).

[8] The conjunctive term material-discursive and other agential realist terms like intra-action are defined below.

an accounting of "nonhuman" as well as "human" forms of agency, and an understanding of the precise causal nature of productive practices that takes account of the fullness of matter's implication in its ongoing historicity. My contribution toward the development of such an understanding is based on a philosophical account that I have been calling "agential realism." Agential realism is an account of technoscientific and other practices that takes feminist, antiracist, poststructuralist, queer, Marxist, science studies, and scientific insights seriously, building specifically on important insights from physicist Niels Bohr brought into conversation with Judith Butler, Michel Foucault, Donna Haraway, Vicki Kirby, Joseph Rouse, and others.[9] I offer a posthumanist performative reformulation of the notion of discursive practices and materiality and theorize a specific causal relationship between them.

Toward a Performative Metaphysics

Thingification – the turning of relations into "things," "entities," "relata" – infects much of the way we understand the world and our relationship to it.[10] Why do we think that the existence of relations requires relata? In this section, I present a relational ontology that rejects the metaphysics of relata, of "words" and "things." On an agential realist account, it is once again possible to acknowledge nature, the body, and materiality in the fullness of their becoming without resorting to the optics of transparency or opacity, the geometries of absolute exteriority or interiority, and the theoretization of the human as either pure cause or pure effect while at the same time remaining resolutely accountable for the role "we" play in the intertwined practices of knowing and becoming.

The postulation of individually determinate entities with inherent properties is the hallmark of atomistic metaphysics. According to Democritus the properties of all things derive from the properties of the smallest unit – atoms (the "uncuttable" or "inseparable"). Liberal social theories and scientific theories alike owe much to the idea that the world is composed of individuals with separately attributable properties. An entangled web of scientific, social, ethical, and political practices, and our understanding of them, hinges on the various/ differential instantiations of this presupposition.

Physicist Niels Bohr won the Nobel Prize for his quantum model of the atom, which marks the beginning his seminal contributions to the development of quantum theory.[11] Bohr's philosophy-physics (the two were inseparable for him) poses

[9]This essay outlines issues I developed in earlier publications including Barad (1996, 1998a, 1998b, 2001b), and in my forthcoming book (Barad 2007).

[10]Relata are would-be antecedent components of relations. According to metaphysical atomism, individual relata always preexist any relations that may hold between them.

[11]Niels Bohr (1885–1962), a contemporary of Einstein, was one of the founders of quantum physics and also the most widely accepted interpretation of the quantum theory, which goes by the name of the Copenhagen interpretation (after the home of Bohr's internationally acclaimed physics institute that bears his name). On my reading of Bohr's philosophy-physics, Bohr can be understood as proposing a protoperformative account of scientific practices.

a radical challenge not only to Newtonian physics but also to Cartesian epistemology. Bohr rejects the atomistic metaphysics that takes "things" as ontologically basic entities. For Bohr, things do not have inherently determinate boundaries or properties, and words do not have inherently determinate meanings. Bohr also calls into question the related Cartesian belief in the inherent distinction between subject and object, and knower and known. It might be said that the epistemological framework that Bohr develops rejects both the transparency of language and the transparency of measurement; even more fundamentally, it rejects the presupposition that language and measurement perform mediating functions. Bohr develops his epistemological framework without giving in to the despair of nihilism or the sticky web of relativism. Unfortunately, Bohr does not explore crucial ontological dimensions of his insights but rather focuses on their epistemological import. I have mined his writings for his implicit ontological views and have elaborated on them in the development of an agential realist ontology.

In this section, I present a quick overview of important aspects of Bohr's account and move on to an explication of an agential realist ontology. This relational ontology explicates […] *a causal (i.e, intra-active) relationship between specific exclusionary practices embodied as specific material configurations of the world* (i.e., discursive practices/(con)figurations rather than "words") *and specific material phenomena* (i.e., relations rather than "things"). This causal relationship between the apparatuses of bodily production and the phenomena produced is one of "agential intra-action."

According to Bohr, *theoretical concepts* (e.g., "position" and "momentum") are not ideational in character but rather *are specific physical arrangements*.[12] For example, the notion of "position" cannot be presumed to be a well-defined abstract concept, nor can it be presumed to be an inherent attribute of independently existing objects. Rather, "position" only has meaning when a rigid apparatus with fixed parts is used. And furthermore, any measurement of "position" using this apparatus cannot be attributed to some abstract independently existing "object" but rather is a property of the *phenomenon* – the inseparability of "observed object" and "agencies of observation." Similarly, "momentum" is only meaningful as a material arrangement involving movable parts. Hence, the simultaneous indeterminacy of "position" and "momentum" is a straightforward matter of the material exclusion of "position" and "momentum" arrangements.

Therefore, according to Bohr, the primary epistemological unit is not independent objects with inherent boundaries and properties but rather *phenomena*. On my agential realist elaboration, phenomena do not merely mark the epistemological inseparability of "observer" and "observed"; rather, *phenomena are the ontological inseparability of agentially intra-acting "components*." That is, phenomena are

[12]Bohr argues on the basis of this single crucial insight, together with the empirical finding of an inherent discontinuity in measurement "intra-actions," that one must reject the presumed inherent separability of observer and observed, knower and known. See Barad (1996, 2007).

ontologically primitive relations – relations without preexisting relata.[13] The notion of *intra-action* (in contrast to the usual "interaction," which presumes the prior existence of independent entities/relata) represents a profound conceptual shift. It is through specific agential intra-actions that the boundaries and properties of the "components" of phenomena become determinate and that particular embodied concepts become meaningful. A specific intra- action (involving a specific material configuration of the "apparatus of observation") enacts an *agential cut* (in contrast to the Cartesian cut) effecting a separation between "subject" and "object." That is, the agential cut enacts a *local* resolution *within* the phenomenon of the inherent ontological indeterminacy. In other words, relata do not preexist relations; rather, relata- within-phenomena emerge through specific intra-actions. Crucially then, intra-actions enact *agential separability* – the local condition of *exteriority-within-phenomena*. The notion of agential separability is of fundamental importance, for in the absence of a classical ontological condition of exteriority between observer and observed it provides the condition for the possibility of objectivity. Moreover, the agential cut enacts a local causal structure among "components" of a phenomenon in the marking of the "measuring agencies" ("effect") by the "measured object" ("cause"). *The notion of intra-action constitutes a reworking of the traditional notion of causality.*[14]

In my further elaboration of this agential realist ontology, I argue that phenomena are not the mere result of laboratory exercises engineered by human subjects. Nor can the apparatuses that produce phenomena be understood as observational devices or mere laboratory instruments. Agential realism offers an understanding of the nature of material-discursive practices, more generally,

[13]That is, relations are not secondarily derived from independently existing "relata," but rather the mutual ontological dependence of "relata" – the relation – is the ontological primitive. As discussed below, relata only exist within phenomena as a result of specific intra-actions (i.e., there are no independent relata, only relata-within-relations).

[14]A concrete example may be helpful. When light passes through a two-slit diffraction grating and forms a diffraction pattern it is said to exhibit wavelike behavior. But there is also evidence that light exhibits particlelike characteristics, called photons. If one wanted to test this hypothesis, the diffraction apparatus could be modified in such a way as to allow a determination of which slit a given photon passes through (since particles only go through a single slit at a time). The result of running this experiment is that there is no longer a diffraction pattern! Classically, these two results together seem contradictory – frustrating efforts to specify the true ontological nature of light. Bohr resolves this wave-particle duality paradox as follows: the objective referent is not some abstract, independently existing entity but rather the phenomenon of light intra-acting with the apparatus. The first apparatus gives determinate meaning to the notion of "wave," while the second provides determinate meaning to the notion of "particle." The notions of "wave" and "particle" do not refer to inherent characteristics of an object that precedes its intra-action. There are no such independently existing objects with inherent characteristics. The two different apparatuses effect different cuts, that is, draw different distinctions delineating the "measured object" from the "measuring instrument." In other words, they differ in their local material resolutions of the inherent ontological indeterminacy. There is no conflict because the two different results mark different intra-actions. See Barad (1996), forthcoming for more details.

including those very practices through which a distinction gets drawn between the "social" and the "scientific."[15]

[According to agential realism,] apparatuses are not mere static arrangements *in* the world, but rather *apparatuses are dynamic (re)configurings of the world*, specific *agential practices/intra-actions/performances through which specific exclusionary boundaries are enacted*. Apparatuses have no inherent "outside" boundary. This indeterminacy of the "outside" boundary represents the im-possibility of closure – the ongoing intra-activity in the iterative reconfiguring of the apparatus of bodily production. Apparatuses are open-ended practices.

Importantly, apparatuses are themselves phenomena. Apparatuses are constituted through particular practices that are perpetually open to rearrangements, rearticulations, and other reworkings. Furthermore, any particular apparatus is always in the process of intra-acting with other apparatuses, and the enfolding of locally stabilized phenomena into subsequent iterations of particular practices constitutes important shifts in the particular apparatus in question and therefore in the nature of the intra-actions that result in the production of new phenomena, and so on. Boundaries do not sit still.

With this background we can now return to the question of the nature of phenomena. Phenomena are produced through agential intra-actions of multiple apparatuses of bodily production. Agential intra-actions are specific causal material enactments that may or may not involve "humans." Indeed, it is through such practices that the differential boundaries between "humans" and "nonhumans," "culture" and "nature," the "social" and the "scientific" are constituted. Phenomena are constitutive of reality. Reality is not composed of things-in-themselves or things- behind-phenomena but "things"-in-phenomena.[16] The world *is* intra-activity in its differential mattering. It is through specific intra-actions that a differential sense of being is enacted in the ongoing web and flow of agency. That is, it is through specific intra-actions that phenomena come to matter – in both senses of the word. The world is a dynamic process of intra-activity in the ongoing reconfiguring of locally determinate causal structures with determinate boundaries, properties, meanings, and patterns of marks on bodies. This ongoing flow of agency through which "part" of the world makes itself differentially intelligible to another "part" of the world and through which local causal structures, boundaries, and properties are stabilized and destabilized does not take place in space and time but in the making of spacetime itself. The world is an ongoing open process of mattering through which "mattering" itself acquires meaning and form in the realization of different agential possibilities. Temporality and spatiality

[15]This elaboration is not based on an analogical extrapolation. Rather, I argue that such anthropocentric restrictions to laboratory investigations are not justified and indeed defy the logic of Bohr's own insights. See Barad (2007).

[16]Because phenomena constitute the ontological primitives, it makes no sense to talk about independently existing things as somehow behind or as the causes of phenomena. In essence, there are no noumena, only phenomena. Agential realist phenomena are neither Kant's phenomena nor the phenomenologist's phenomena.

emerge in this processual historicity. Relations of exteriority, connectivity, and exclusion are reconfigured. The changing topologies of the world entail an ongoing re-working of the very nature of dynamics.

In summary, the universe is agential intra-activity in its becoming. The primary ontological units are not "things" but phenomena – dynamic topological reconfigurings/ entanglements/ relationalities/ (re)articulations. And the primary semantic units are not "words" but material-discursive practices through which boundaries are constituted. This dynamism *is* agency. Agency is not an attribute but the ongoing reconfigurings of the world.

A Posthumanist Account of Material-Discursive Practices

In this section, I propose a posthumanist account of discursive practices. I also outline a concordant reworking of the notion of materiality and offer an agential realist approach to understanding the relationship between discursive practices and material phenomena.

On an agential realist account, *discursive practices are specific material (re)configurings of the world through which local determinations of boundaries, properties, and meanings are differentially enacted. That is, discursive practices are ongoing agential intra-actions of the world through which local determinacy is enacted within the phenomena* produced. *Discursive practices are causal intra-actions* – they enact local causal structures through which one "component" (the "effect") of the phenomenon is marked by another "component" (the "cause") in their differential articulation. Meaning is not a property of individual words or groups of words but an ongoing performance of the world in its differential intelligibility. In its causal intra-activity, "part" of the world becomes determinately bounded and propertied in its emergent intelligibility to another "part" of the world. Discursive practices are boundary-making practices that have no finality in the ongoing dynamics of agential intra-activity.

Discursive practices are not speech acts, linguistic representations, or even linguistic performances, bearing some unspecified relationship to material practices. Discursive practices are not anthropomorphic placeholders for the projected agency of individual subjects, culture, or language. Indeed, they are not human-based practices. On the contrary, agential realism's posthumanist account of discursive practices does not fix the boundary between "human" and "nonhuman" before the analysis ever gets off the ground but rather enables a genealogical analysis of the discursive emergence of the "human." "Human bodies" and "human subjects" do not preexist as such; nor are they mere end products. "Humans" are neither pure cause nor pure effect but part of the world in its open-ended becoming.

On an agential realist account, matter does not refer to a fixed substance; rather, *matter is substance in its intra-active becoming – not a thing, but a doing, a* congealing *of agency. Matter is a stabilizing and destabilizing process of iterative*

intra-activity. Phenomena come to matter through this process of ongoing intra-activity. That is, *matter refers to the materiality/materialization of phenomena*, not to an inherent fixed property of abstract independently existing objects of Newtonian physics. Matter is not simply "a kind of citationality" (Butler 1993, 15), the surface effect of human bodies, or the end product of linguistic or discursive acts. Material constraints and exclusions and the material dimensions of regulatory practices are important factors in the process of materialization. The dynamics of intra-activity entails matter as an *active* "agent" in its ongoing materialization.

Boundary-making practices, that is, discursive practices, are fully implicated in the dynamics of intra-activity through which phenomena come to matter. In other words, materiality is discursive (i.e., material phenomena are inseparable from the apparatuses of bodily production: matter emerges out of and includes as part of its being the ongoing reconfiguring of boundaries), just as discursive practices are always already material (i.e., they are ongoing material (re)configurings of the world). Discursive practices and material phenomena do not stand in a relationship of externality to one another; rather, the material and the discursive are mutually implicated in the dynamics of intra-activity. But nor are they reducible to one another. The relationship between the material and the discursive is one of mutual entailment. Neither is articulated/articulable in the absence of the other; matter and meaning are mutually articulated. Neither discursive practices nor material phenomena are ontologically or epistemologically prior.

Apparatuses of bodily production and the phenomena they produce are material-discursive in nature. *Material-discursive practices are specific iterative enactments – agential intra*-actions *– through which matter is differentially engaged and articulated* (*in the emergence of boundaries and meanings*), *reconfiguring the material-discursive field of possibilities in the iterative dynamics of intra-activity that is agency*. Intra-actions are causally constraining nondeterministic enactments through which matter-in-the- process-of-becoming is sedimented out and enfolded in further materializations.[17]

Material conditions matter, not because they "support" particular discourses that are the actual generative factors in the formation of bodies but rather because *matter comes to matter* through the iterative intra- activity of the world in its becoming. The point is not merely that there are important material factors in addition to discursive ones; rather, the issue is the conjoined material-discursive nature of constraints, conditions, and practices. The fact that material and discursive constraints and exclusions are entangled points to the limited validity of analyses that attempt to determine individual effects of material or discursive factors.[18] Furthermore, the conceptualization of materiality offered by agential realism makes it possible to take account of material constraints and conditions once again without reinscribing

[17]The nature of causal intra-actions is discussed further in the next section.

[18]See Barad (1998b, 2001a, 2001b, 2007) for examples.

traditional empiricist assumptions concerning the transparent or immediate givenness of the world and without falling into the analytical stalemate that simply calls for a recognition of our mediated access to the world and then rests its case. The reconceptualization of materiality offered here makes it possible to take the empirical world seriously once again, but this time with the understanding that the objective referent is phenomena, not the seeming "immediately givenness" of the world.

All bodies, not merely "human" bodies, come to matter through the world's iterative intra-activity – its performativity. This is true not only of the surface or contours of the body but also of the body in the fullness of its physicality. Bodies are not objects with inherent boundaries and properties; they are material-discursive phenomena. "Human" bodies are not inherently different from "nonhuman" ones. What constitutes the "human" (and the "nonhuman") is not a fixed or pregiven notion, but nor is it a free-floating ideality. What is at issue is […] a material dynamics of intra-activity: material apparatuses produce material phenomena through specific causal intra-actions, where "material" is always already material-discursive – *that is what it means to matter*. Theories that focus exclusively on the materialization of "human" bodies miss the crucial point that the very practices by which the differential boundaries of the "human" and the "nonhuman" are drawn are always already implicated in particular materializations. The differential constitution of the "human" ("non-human") is always accompanied by particular exclusions and always open to contestation. This is a result of the nondeterministic causal nature of agential intra-actions, a crucial point that I take up in the next section.

The Nature of Production and the Production of Nature: Agency and Causality

What is the nature of causality on this account? What possibilities exist for agency, for intervening in the world's becoming? Where do the issues of responsibility and accountability enter in?

Agential intra-actions are causal enactments. Recall that an agential cut effects a local separability of different "component parts" of the phenomenon, one of which ("the cause") expresses itself in effecting and marking the other ("the effect"). In a scientific context this process is known as a "measurement." (Indeed, the notion of "measurement" is nothing more or less than a causal intra-action.)[19] [W]hat is important about causal intra-actions is the fact that marks are left on bodies. Objectivity means being accountable to marks on bodies.

[19]I am grateful to Joe Rouse for putting this point so elegantly (private conversation). Rouse (2002) suggests that measurement need not be a term about laboratory operations, that before answering whether or not something is a measurement a prior question must be considered, namely, What constitutes a measurement of what?

Whether it is thought of as a "measurement," or as part of the universe making itself intelligible to another part in its ongoing differentiating intelligibility and materialization, is a matter of preference.This causal structure differs in important respects from the common choices of absolute exteriority and absolute interiority and of determinism and free will. In the case of the geometry of absolute exteriority, the claim that cultural practices produce material bodies starts with the metaphysical presumption of the ontological distinction of the former set from the latter.

The inscription model of constructivism is of this kind: culture is figured as an external force acting on passive nature. There is an ambiguity in this model as to whether nature exists in any prediscursive form prior to its marking by culture. If there is such an antecedent entity then its very existence marks the inherent limit of constructivism. In this case, the rhetoric should be softened to more accurately reflect the fact that the force of culture "shapes" or "inscribes" nature but does not materially *produce* it. On the other hand, if there is no preexistent nature, then it behooves those who advocate such a theory to explain how it is that culture can materially produce that from which it is allegedly ontologically distinct, namely nature. What is the mechanism of this production? The other usual alternative is also not attractive: the geometry of absolute interiority amounts to a reduction of the effect to its cause, or in this case nature to culture, or matter to language, which amounts to one form or another of idealism.

Agential separability […] postulates [instead] a sense of "exteriority within," […] and opens up a much larger space that is more appropriately thought of as a changing topology.[20] More specifically, *agential separability* is a matter of *exteriority within* (*material-discursive*) *phenomena*. Hence, no priority is given to either materiality or discursivity.[21] There is no geometrical relation of absolute exteriority between a "causal apparatus" and a "body effected," nor an idealistic collapse of the two, but rather an ongoing topological dynamics that enfolds the spacetime manifold upon itself, a result of the fact that the apparatuses of bodily production are part of the phenomena they produce. Matter plays an active, indeed agential, role in its iterative materialization, but this is not the only reason that the space of agency is much larger than that postulated in many other critical social theories.[22]

[20]Geometry is concerned with shapes and sizes (this is true even of the non-Euclidean varieties, such as geometries built on curved surfaces like spheres rather than on flat planes), whereas topology investigates questions of connectivity and boundaries. Although spatiality is often thought of geometrically, particularly in terms of the characteristics of enclosures (like size and shape), this is only one way of thinking about space. Topological features of manifolds can be extremely important. For example, two points that seem far apart geometrically may, given a particular connectivity of the spatial manifold, actually be proximate to one another (as, e.g., in the case of cosmological objects called "wormholes").

[21]In contrast to Butler's "constitutive outside," for example.

[22]For example, the space of agency is much larger than that postulated by Butler's or Louis Althusser's theories. There is more to agency than the possibilities of linguistic resignification, and the circumvention of deterministic outcome does not require a clash of apparatuses/ discursive demands (i.e., overdetermination).

Intra-actions always entail particular exclusions, and exclusions foreclose any possibility of determinism, providing the condition of an open future.[23] Therefore, intra-actions are constraining but not determining. That is, intra-activity is neither a matter of strict determinism nor unconstrained freedom. The future is radically open at every turn. This open sense of futurity does not depend on the clash or collision of cultural demands; rather, it is inherent in the nature of intra-activity – even when apparatuses are primarily reinforcing, agency is not foreclosed. Hence, the notion of intra-action reformulates the traditional notion of causality and opens up a space, indeed a relatively large space, for material-discursive forms of agency.

A posthumanist formulation of performativity makes evident the importance of taking account of "human," "nonhuman," "cyborgian," and other forms of agency. This is both possible and necessary because agency is a matter of changes in the apparatuses of bodily production, and such changes take place through various intra-actions, some of which remake the boundaries that delineate the differential constitution of the "human." Holding the category "human" fixed excludes an entire range of possibilities in advance, eliding important dimensions of the workings of power.

On an agential realist account, agency is cut loose from its traditional humanist orbit. Agency is not aligned with human intentionality or subjectivity. Nor does it merely entail resignification or other specific kinds of moves within a social geometry of antihumanism. Agency is a matter of intra-acting; it is an enactment, not something that someone or something has. Agency cannot be designated as an attribute of "subjects" or "objects." Agency is "doing"/"being" in its intra-activity. Agency is the enactment of iterative changes to particular practices through the dynamics of intra-activity. Agency is about the possibilities and accountability entailed in reconfiguring material-discursive apparatuses of bodily production, including the boundary articulations and exclusions that are marked by those practices in the enactment of a causal structure. Particular possibilities for acting exist at every moment, and these changing possibilities entail a responsibility to intervene in the world's becoming, to contest and rework what matters and what is excluded from mattering.

Conclusions

Feminist studies, queer studies, science studies, cultural studies, and critical social theory scholars are among those who struggle with the difficulty of coming to terms with the weightiness of the world.

I have proposed a posthumanist materialist account of performativity that challenges the positioning of materiality as either a given or a mere effect of human agency. On an agential realist account, materiality is an active factor in processes

[23]This is true at the atomic level as well. Indeed, as Bohr emphasizes, the mutual exclusivity of "position" and "momentum" is what makes the notion of causality in quantum physics profoundly different from the determinist sense of causality of classical Newtonian physics.

of materialization. Feminist science studies scholars in particular have emphasized that foundational inscriptions of the nature/culture dualism foreclose the understanding of how "nature" and "culture" are formed, an understanding that is crucial to both feminist and scientific analyses. They have also emphasized that the notion of "formation" in no way denies the material reality of either "nature" or "culture." Hence, any performative account worth its salt would be ill advised to incorporate such anthropocentric values in its foundations.

A crucial part of the performative account that I have proposed is a rethinking of the notions of discursive practices and material phenomena and the relationship between them. On an agential realist account, discursive practices are not human-based activities but rather specific material (re)configurings of the world through which local determinations of boundaries, properties, and meanings are differentially enacted. And matter is not a fixed essence; rather, matter is substance in its intra-active becoming – not a thing but a doing, a congealing of agency. And performativity is not understood as iterative citationality (Butler) but rather iterative intra-activity.

On an agential realist account of technoscientific practices, the "knower" does not stand in a relation of absolute externality to the natural world being investigated.[24] It is therefore not absolute exteriority that is the condition of possibility for objectivity but rather agential separability – exteriority within phenomena.[25] "We" are not outside observers of the world. Nor are we simply located at particular places *in* the world; rather, we are part *of* the world in its ongoing intra-activity. This is a point Niels Bohr tried to get at in his insistence that our epistemology must take account of the fact that we are a part of that nature we seek to understand. Unfortunately, however, he cuts short important posthumanist implications of this insight in his ultimately humanist understanding of the "we." Vicki Kirby eloquently articulates this important posthumanist point:

> I'm trying to complicate the locatability of human identity as a here and now, an enclosed and finished product, a causal force upon Nature. Or even … as something within Nature. I don't want the human to be in Nature, as if Nature is a container. Identity is inherently unstable, differentiated, dispersed, and yet strangely coherent. If I say "this is Nature itself," an expression that usually denotes a prescriptive essentialism and that's why we avoid it, I've actually animated this "itself" and even suggested that "thinking" isn't the other of nature. Nature performs itself differently.[26]

[24]Others have made this point as well, e.g., Haraway (1991); Kirby (1997); Rouse (2002); and Bohr.

[25]The notion of agential separability, which is predicated on the agential realist notion of intra-actions, has far-reaching consequences. Indeed, it can be shown to play a critical role in the resolution of the "measurement problem" and other long-standing problems in quantum theory. See Barad (2007).

[26]Vicki Kirby (private communication, 2002). Kirby's sustained interrogation of the tenacious nature/culture binary is unparalleled. See Kirby 1997 for a remarkable "materialist" (my description) reading of Derridean theory.

The particular configuration that an apparatus takes is not an arbitrary construction of "our" choosing; nor is it the result of causally deterministic power structures. "Humans" do not simply assemble different apparatuses for satisfying particular knowledge projects but are themselves specific local parts of the world's ongoing reconfiguring. To the degree that laboratory manipulations, observational interventions, concepts, or other human practices have a role to play it is as part of the material configuration of the world in its intra-active becoming.

There is an important sense in which practices of knowing cannot be fully claimed as human practices, not simply because we use nonhuman elements in our practices but because knowing is a matter of, part of the world making itself intelligible to another part. Practices of knowing and being are not isolatable, but rather they are mutually implicated. We do not obtain knowledge by standing outside of the world; we know because "we" are *of* the world. We are part of the world in its differential becoming. The separation of epistemology from ontology is a reverberation of a metaphysics that assumes an inherent difference between human and nonhuman, subject and object, mind and body, matter and discourse. *Onto-epistem-ology* – the study of practices of knowing in being – is probably a better way to think about the kind of understandings that are needed to come to terms with how specific intra-actions matter.

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C. Åsberg, R. Braidotti (eds.), *A Feminist Companion to the Posthumanities*,
https://doi.org/10.1007/978-3-319-62140-1

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