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A posthumanist pedagogy using digital text analysis to enhance critical thinking in higher education

Abstract

I model a critical posthumanist pedagogy that uses text analysis software and is aimed at higher education students. The purpose of the pedagogy is to help students enhance independent and critical thinking. For their project assignment, the student chooses an *unfamiliar* campaign seeking to eliminate specific suffering and extend rights. They gather all texts from the campaign website into a corpus, which thus represents the campaign writ large. Then they use appropriate software to ascertain, efficiently and rigorously, common campaign concerns across this corpus. This puts students in a position to discern any significant concerns in the campaign corpus that are *not* addressed in text(s) supporting the status quo which the campaign opposes. Should significant omissions be found, students critically evaluate the status quo text(s) *from the campaign's perspective*. Since this perspective derives from the student identifying (at least temporarily) with software generated data, it is a *posthuman subjectivity*. Engaging digitally with a campaign's data at scale for creation of a posthuman subjectivity has the following benefits. It can foster new empathies, broadening awareness of disadvantage, discrimination and suffering and expanding horizons. Crucially, at the end of the assignment, the student is expected to *formulate their own position* vis-à-vis the previously unfamiliar campaign. Conditions have been created then for the student to enhance independent and critical thinking.

keywords: critical posthumanism; critical posthumanist pedagogy; corpus linguistics; critical thinking; higher education; intra-action; nonhuman animal experimentation; posthumanism; posthuman subjectivities; text analysis software; WMatrix software; AntConc software.

1. Introduction

1.1 Orientation

Although posthumanism has been influential across a variety of disciplines for some time, it is only in recent years that reflection on, and development of, posthumanist pedagogies have begun in earnest.¹ Despite this, as the posthumanist educationalist Sîan Bayne highlights, posthumanism is ‘...under-used in considerations of digital education in particular’ (Bayne, 2016: 82). This article outlines and models a critical posthumanist pedagogy aimed at higher education students. The purpose of the pedagogy is to help students enhance independent and critical thinking. I use this pedagogy in an undergraduate module that I teach called “*Critical Posthumanism, Digital Data*”.² The distinctiveness of the posthumanist pedagogy outlined here is its reliance on text analysis software. I discuss the pedagogy and the module in detail later in the article. For now, and in order to orient the reader to the pedagogy, I outline the module assignment.

1.2 The module assignment

1.2.1 What the students do

For their assignment, the student chooses a website of a campaign that seeks to diminish suffering and extend rights. Importantly, the campaign focus should be one that the student does not know in any real depth. The student accumulates as many texts as possible into a corpus from this campaign website. This leaves them with a corpus which represents writ large the campaign focus. Following this text compilation, the student uses appropriate software to ascertain, efficiently and rigorously, common concerns across the corpus. Since the corpus is as comprehensive as possible, as well as (mostly) unfamiliar, much of the information they find is likely to be new.

The next stage of the pedagogy is critically contrastive. The student finds a widely circulated text (or texts) which supports the status quo that the campaign opposes. They assess any significant concerns in the campaign corpus which are *not* addressed in the status quo text(s) and, in turn, have implications for the credibility of this text(s) relative to the campaign. Should such omissions be found, the student takes apart or ‘deconstructs’ the status quo text(s) *from the perspective of the campaign*. The campaign should be one that the student is comfortable empathising with, at least for the duration of their project.

1.2.2 Rationale of the assignment

Since the student has to engage with a sizeable amount of data from a (relatively) unfamiliar campaign, in a sustained digitally-driven manner, as well as view the status quo text(s) through the wide-angle lens of the campaign corpus, their horizons are necessarily expanded in being opened out to new appreciation of suffering and marginalisation. Usefully, a new vantage point has been created for the student to think with, facilitating critical review of any extant attitudes on the campaign topic. Indeed, the assignment exploits this new vantage by expecting the

¹ E.g., Bayley (2018); Bayley and Taylor (2018); Kuby (2017); Smythe et al. (2017); Snaza et al. (2014); Snaza and Weaver (2015); Taylor and Bayley (2019).

² <https://www.kcl.ac.uk/study/courses-data/modules/6/critical-posthumanism-digital-data-6ssel030> [Accessed May 2019].

student to arrive *at their own position* vis-à-vis the previously unfamiliar standpoint. Conditions have been created then for the student to enhance independent and critical thinking.

1.3 Posthuman subjectivities and critique

The wide-angle lens through which the student views the status quo text(s) is a “posthuman subjectivity”. A subjectivity is an outlook, a way of viewing the world. As intelligent technology has increasingly interpenetrated human consciousness, this has afforded the creation of digitally-driven subjectivities, that is to say subjectivities which depend on the blurring of the human / machine interface. For example, our identification with an avatar when we play a video game is not a straightforward human subjectivity. The encounters of our virtual self, our avatar vanquishing monsters or being embattled by same, affect our human self in eliciting feelings such as satisfaction or frustration as well as bodily phenomena such as heart rate. Since this gaming subjectivity depends on human identification with a machine-created avatar, it is not a human subjectivity but a *posthuman* subjectivity (Braidotti, 2013a; Wilde and Evans, forthcoming).

Other posthuman subjectivities have potential for fostering empathy since they can compel us to see the world from the perspective of the Other. A particular digital technology which is becoming popular for creating posthuman subjectivities for affording empathy is Virtual Reality (VR).³ Through its capacity to immerse humans in the world of the sufferer and marginalised and to create conditions for identifying (at least temporarily) with the experience of this Other, VR is showing promise for engendering empathy (Schutte and Stilinović, 2017). This article aligns with wider emerging technological affordances and initiatives that are generating posthuman subjectivities for purposes of facilitating empathy.

1.4 Organisation

In section 2, I provide background to posthumanism and then highlight, in section 3, key orientations within it for creating posthuman subjectivities. These orientations inform the digitally-driven posthumanist pedagogy presented here, which I outline in detail in section 4. The campaign chosen for modelling the pedagogy is PETA (‘People for the Ethical Treatment of Animals’). I show, in section 6, how a wide-angle posthuman subjectivity can be created from aggregating all the texts from the PETA website which oppose animal testing - 35, 000 words in total - and then using the text analysis software WMatrix (Rayson, 2009) to find the most recurrent concerns in this corpus. The status quo texts to be viewed through the lens of this posthuman subjectivity come from the US Food and Drug Administration (FDA) website on ‘animal testing’. (I discuss this status quo data in section 5). Using this posthuman subjectivity, I model in section 7 how the FDA texts can be complicated relative to the PETA animal testing corpus. Section 8 provides reflection on the pedagogy modelled here and Section 9 reflects on my teaching of the module “Critical Posthumanism, Digital Data”.

³ Some charities have developed VR apps to enhance appreciation of suffering, e.g. humans experiencing Alzheimer’s or nonhuman animals experiencing human cruelty. See, for example: <https://www.charitydigitalnews.co.uk/2018/03/01/five-ways-charities-using-virtual-reality/> [Accessed May 2019]

2. What is posthumanism?

To act in a posthumanist manner is to challenge an everyday state of mind that we humans are the focal point of planetary existence, that we are autonomously separate from our environment, other animals and machines, that we are essentially different from other species, with an importance too that entitles us to exploit our environment and other animals (see for example, Braidotti, 2013a; Herbrechter, 2013; Wolfe, 2010). The challenge to this state of mind has been prompted by a number of key phenomena:

- the *Anthropocene* - a new epoch where human activity is detrimentally affecting the climate, the environment, rapidly reducing biodiversity and affecting human survival let alone the survival of other species;
- evidence that genes are shared across different species and thus that life on planet Earth is genetically interconnected; this evidence from genetics further confirms the already immense support for the Darwinian explanation of the origins of life from palaeontology, geology, developmental biology etc;
- the discovery of numerous species of bacteria and other microbes in the human gut (the ‘human microbiome’) which facilitate digestion and support the immune system and, more generally, suggests that humans evolved with microbes (Dominguez-Bello et al. (2019);
- the revelation that many nonhuman animals display intelligent (and emotional) behaviors previously thought only to be human, e.g. the making and use of tools by corvids (Rutz et al., 2018);
- the rapidly accelerating interpenetration of intelligent technologies / digital data with human life which, in turn, is shaping new thoughts and behaviors.

“Critical Posthumanism” is the scholarly critical reflection on these new conditions and discoveries (see, for example, Herbrechter, 2013). It rethinks i) *humanism*, the assumption that humans are essentially distinct and autonomous from other animals as well as machines, and that our experience of individual consciousness is distinct from the same; ii) *anthropocentrism*, where it is automatically assumed that *Homo sapiens* is at the center of the world and thus more important than other animal species; iii) *human instrumentalism*, that humans automatically have the right to exploit the natural world including nonhuman animals. Critical posthumanist scholars are critical of humanism and the individualistic subject associated with it. They seek to:

‘...move beyond the traditional humanist ways of thinking about the autonomous, self-willed individual agent in order to treat the human itself as an assemblage, co-evolving with other forms of life, enmeshed with the environment and technology.’ Nayar (2014: 4)

This criticism has an empirical basis in reflecting the evidence that we are genetically and environmentally interconnected with other species as well as increasingly interconnected with intelligent technologies. It is also morally-based in exhorting us no longer to see ourselves at the center of life, but to “decenter ourselves”, to see our human life “as enmeshed with the environment and technology”. If we humans are to ensure a positive environmental legacy for future generations of humans *and* nonhumans, we have to appreciate this basic fact of

interconnectedness with our environment and other forms of life, and understand profoundly that the autonomous humanist mindset of *human instrumentalism* has self-harmingly produced the *Anthropocene*. All the same, critical posthumanism does not necessarily entail a radical break with humanism. One of its intellectual strengths is that it reframes existing humanist thinking and scholarship ‘in order to determine what ought to be salvaged, reformed, or abandoned’ (Nichols and Campano, 2017: 248).

Critical posthumanism has a very large number of strands and influences, not always (completely) convergent, such as actor network theory, alien phenomenology, critical animal studies, cybernetics, Deleuzian rhizomatics, evolutionary biology, new materialism, new material feminism, object-oriented-ontology, post-colonialism, queer theory, speculative realism. And, naturally, not all scholars agree; different scholars emphasize one or more strands over others, and so on. With its vast scope - ‘the human’ and its relationship to the rest of the planet - and with these varied and at times disparate sources, it is hardly surprising that posthumanism is ‘a concept in motion’ (Taylor, 2016: 21). Despite the range of influences, there are several touchstone concepts and orientations which are largely recognisable across a critical posthumanist outlook. One of these has just been mentioned - *decentering of human subjectivity*. In Section 3, I detail other inspirations in posthumanism for generating posthuman subjectivities as well as elaborate upon some fundamental assumptions just flagged. As the reader will see later, they inform the pedagogy offered in this article.

3. Key orientations for creating posthuman subjectivities

3.1 Deleuze’s “positive difference”

Making the effort to decenter our habitual ways of looking at the world entails that our subjectivity will then differ from what it was previously. To decenter, and thus to be critically posthumanist, is to *create difference*. A major influence on this orientation is Gilles Deleuze’s philosophy of creativity. He fashions a fundamental distinction between negative difference and positive difference (Deleuze, 2004). An everyday car is different from an everyday bicycle because the former has four wheels, an engine and so on. In this commonplace way of contrasting, difference is subordinate to identity. The contrast depends upon reasonably stable identities of the car and bicycle. From the perspective of his creative philosophy, the commonplace subordination of identity to difference is troubling for Deleuze. Creativity implies change and so identities should never be stable. This is why contrasting the reasonably stable identities of the car and bicycle, as I did above, would involve *negative difference* for Deleuze.

In the process of creation - creating identity, art, music etc - difference takes precedence over identity. This is what Deleuze sees as *positive difference*. In the creative process, inventing new styles of painting which differ from older styles and so on, innovators experiment with different vantages, continually decentering from whatever identity or tradition they previously operated with. This differing process leads to an emergent destination rather than one which is pre-figured. The unforeseen arrival point in the process of ‘differing-becoming’ facilitates creativity. Positive difference can be illustrated in myriad ways. Here is one - Willem de Kooning’s process for painting his famous ‘Woman I’.⁴ Experimentally generated over a long period (1950-1952), de Kooning would paint the female figure, then reject each attempt, brushing over, and restarting though retaining haphazardly some of his previous efforts. Each iterative chancy unstable ‘identity’ of the painting differed from the

⁴ <https://www.moma.org/collection/works/79810> [Accessed May 2019].

previous chancy unstable ‘identity’ in this long process of the painting becoming something else. That is to say, in de Kooning’s lengthy (re)making of ‘Woman I’, each unstable ‘identity’ on the canvas was much less important than the processual “differing-becoming” of his painting.

3.2 Experimentation, emergence and multiple novel subjectivities

Subjectivities in posthuman pedagogy echo Deleuze’s positive difference, this experimental and haphazardly emergent process of differing-becoming. This means that there is no static subject position for the student in posthuman pedagogies. Rather new subject positions *emerge* from the student’s series of experimental entanglements with research objects and data, with each entanglement differing from the previous (Smythe et al., 2017; Murris and Borchers, 2019). The recurrent differing-becoming of the analyst, their continual decentering from previous perspectives, echoing the experimental process of creative making, facilitates seeing processually the research data in fresh and inventive ways. A pedagogy is not posthuman if it does not allow the student to experiment with new connections with data, materials, software etc which the teacher did not anticipate and, in turn, push the student to multiple novel subjectivities.

3.3 Entanglement and intra-action

Anthropocentrism leads to a reified, illusory and increasingly dangerous human consciousness with us humans ‘over here’ and the environment ‘over there’. A salient example of anthropocentrism: our upsetting of environmental equilibria whilst being dimly aware of the destructive effect on vast numbers of nonhuman agencies, e.g., insect pollinators, that our survival and that of other species depends on. Grasping the interconnectedness of life is a *sine qua non* of critical posthumanism. Humans never act in isolation, but instead always in assemblages of other humans, nonhuman animals and the material world (‘assemblage’ is a term found in Deleuze and Guattari, 1987).

This idea of entanglement of the human with its environment and other species is hardly new. It can be found in Darwin’s works, for example, such as his meditation on earthworms:

‘Worms have played a more important part in the history of the world than most persons would at first assume.’ Darwin (1881: 305) cited in Bennett (2010: 95)

Worms have what Jane Bennett calls ‘small agency’ (Bennett, 2010: 95). This is not a claim that earthworms have intentionality or are in any sense aware of the benefits they have brought humanity. Rather Bennett is pointing out that the intentional agencies of human agriculture have been inextricably linked to and, dependent on, a vast assemblage of non-intentional agencies. ‘Agency’ here is, in reality, enormously dispersed and entangled:

‘It would be consistent with Darwin to say that worms participate in heterogeneous assemblages in which agency has no single locus, no mastermind, but is distributed across a swarm of various and variegated vibrant materialities’. Bennett (2010: 96)

A more recent concept echoing the entangled nature of human activity with the nonhuman world is Karen Barad’s *intra-action*:

‘...in contrast to the usual “interaction”, which assumes that there are separate individual agencies that precede their interaction, the notion of intra-action recognizes that distinct agencies do not precede, but rather emerge through, their intra-action.’ Barad (2007: 33)

The everyday notion of ‘interaction’ assumes that who or what in the material world we connect with is outside of us. In contrast, intra-action signals the agency that *emerges* once humans and (non)humans are entangled and produces newness. Intra-active agencies - somewhere between intention and non-intention - do not lie exclusively in the human, but in the dynamic *in-between-ness* of humans, nonhumans and the material world (Barad, 2007). For example, in our downtime flitting from weblink to weblink whose manifestations may be due to behind-the-scenes machine learning of our web behaviors, we find ourselves within a digital assemblage which in part prompts our leisure flows. In such moments, intra-actions are taking place.

3.4 Intra-action and digital materialism

The so-called ‘material turn’ of posthumanism generally, and specifically in its sub-branch ‘New Materialism’,⁵ does not so much extinguish the ‘linguistic’ turn in the humanities and social sciences since the early 20th century, but rather off-centers its dominance. The need for greater focus on the material alongside the linguistic is self-evident given the contemporary ubiquity of communication via digital devices and the pervasive use of software more generally. We talk commonly about software ‘tools’ as though the software and the data it generates are always under our agency. Yet this betrays a humanistic discourse which does not account for a different kind of agency - the intra-actions which can occur in our habitual immersion in digital technology (Gourlay, 2019).

To illustrate the markedness of this change, consider first the communication scholar, Gunther Kress, focusing on children’s non-digitally based communication in the 1990s:

‘The children are in charge, they choose the materials which best serve their sign-making purposes, they construct the signs as plausible, apt expressions of their interest, and act transformatively on them’.
Kress (1997: 33)

In Kress’s outlook, the human agent is *separate* from the materials which they then use to make meaning. But in a contemporary classroom hooked up to the world-wide-web and thus potentially to machine learning, with children using digital devices, with the various technological immersions and entanglements that characterize contemporary human learning, agency is not exclusively in the child. Here is the literacy scholar Candace Kuby shining a posthumanist light on Kress above:

‘... it might sound like a subtle difference, but posthumanist scholars would say their focus of analysis is on the human $\longleftrightarrow$ nonhuman (materials) entangled together, not children acting on materials. Posthumanist scholars see this shift as monumental and ask, what is produced in this entanglement with materials?’
Kuby (2017: 882-883)

Kress is clearly signalling that children *inter-act* with materials to make meaning. Naturally, writing in the mid-90s before smart mobile / wearable devices and the staggering interpenetration of the web in human life, Kress could not explore the *intra-actions* which can emerge in the complicated assemblage of humans and digital technologies. Indeed, for research focused on digital communication, the sociolinguists Mary Bucholtz and Kira Hall posit the *assemblage of human and technology* as the primary research focus rather than the human user of the technology (Bucholtz and Hall, 2016: 187).

⁵ E.g., Coole and Frost (2010); Dolphijn and van der Tuin (2012).

3.5 Embodied and distributed technologized subjectivities

Bucholtz and Hall's posthumanist posit of the human/digital assemblage as primary research focus in digitally-based communication echoes the earlier pioneering vision of N. Katherine Hayles in *How We Became Posthuman*:

'In the posthuman, there are no essential differences or absolute demarcations between bodily existence and computer simulation, cybernetic mechanism and biological organism, robot teleology and human goals.'

Hayles (1999: 3)

While she sees the human and machine as enmeshed, nevertheless Hayles regards the experience of embodiment of the human as a characteristic of the posthuman condition. She refers to the absorption of the digitalized virtual world into our bodily experience, in our use of intelligent technologies, as 'embodied virtuality'. As Hayles sees it, it is the very 'embodied virtuality' of the posthuman which affords the potential for producing *new subjectivities* (Hayles, 1999: *passim*). Indeed, she views this benefit as the crux of the posthuman. Finally, a corollary of the above positions of Barad and Hayles is that, where intelligent machines and humans are enmeshed, subjectivities are *distributed*:

'This distributed subjectivity paradigm in posthumanism treats the human form as an *interface* rather than a self-contained structure, closed off and independent.'

Nayar (2014: 64)

The pedagogy that I model later requires students to produce a distributed technologized subjectivity.

3.6 Rhizomatic learning: creating new connections

A mighty inspiration for critical posthumanism is Gilles Deleuze and Félix Guattari's *A Thousand Plateaus* (Deleuze and Guattari, 1987). A key figure from this work, for creating posthuman subjectivities, is the *rhizome*. An actual rhizome is something botanical: a horizontal underground stem which grows via subterranean networks, helping to spread plants such as ginger and turmeric haphazardly over a large area. Because roots or shoots can sprout from any part of their stems, rhizomes do not have a top or bottom. Deleuze and Guattari view the rhizome as a productive image of creative thought, as unpredictable, growing in various directions from multiple inputs and outputs, leading to fresh connections and discoveries and, in so doing, eschewing boundaries (Deleuze and Guattari, 1987: 23). "Rhizomatic thinking", as they highlight, is thus unpredictable and transformative.

The figure of the rhizome has been influential on pedagogy (Cole, 2015; Cormier, 2008; Edwards, 2015). A 'rhizomatic pedagogy', and in turn a posthumanist pedagogy, stresses the importance of students undergoing personal learning adventures that experiment with novel connection-making and, in turn, lead to unpredictable turns, to positive difference and creativity, to fresh and unusual perspectives.

3.7 Ethical outlook

3.7.1 Nomadic ethics and surprise

As with Hayles, the capacity for creating novel subjectivities, in the digital age, is stressed by the posthumanist philosopher, Rosi Braidotti. Since digital technology allows Self to interface

with a multitude of new Others, in Braidotti's posthumanism this capacity can lead to the creation of new subjectivities which have an *ethical* basis:

'...technological mediation is central to a new vision of posthuman subjectivity and that it provides the grounding for new ethical claims.'
Braidotti (2013a: 90)

'A sustainable ethics for non-unitary [posthuman] subjects rests on an enlarged sense of inter-connection between self and others...'.
Braidotti (2013a: 190)

The posthumanist principle of finding ways in our study to 'take data into ourselves', so as to drive formation of new subjectivities, entails that 'the "what" of the study must be able to participate, to *surprise* the researcher' (Snaza et al., 2014: 50; 52). In Braidotti's 'nomadic ethics' (e.g. Braidotti, 2012), the exhortation is not just to open out to new Others who come conveniently into one's ken, but actively to seek out new Others, to act *nomadically* in one's desire to create posthuman subjectivities. In turn, this is more likely to surprise the creator of a posthuman subjectivity, which helps with jolting out of habitual human(ist) subjectivity.

Naturally enough, as a philosopher, Braidotti does not offer blueprints for constructing technologized posthuman subjectivities. Section 4 and beyond of this article highlights one way of achieving this using data aggregated from the web and text analysis software. This is the basis for a digitally-driven pedagogy which, as the reader will see, includes the above key orientations for creating posthuman subjectivities. Before I move on to discussing the pedagogy, allow me to elaborate Braidotti's ethical vision by discussing its roots in the ethics of Gilles Deleuze and Félix Guattari. I do this, principally, because I adopt this posthuman ethics in my pedagogy.

3.7.2 *Becoming-minoritarian*

Braidotti's nomadic ethics derives, to a significant extent, from the ethical vision of *A Thousand Plateaus*. Deleuze and Guattari's book also exhorts us to empathize with the Other and, in doing so, decenter our naturalized outlook. By trying to occupy as best we can the perspective of the oppressed, marginalized, suffering Other, for Deleuze and Guattari we 'become-other' by attempting to walk in that Other's shoes. The Other which Deleuze and Guattari have in mind is what they refer to as *minoritarian*.

Minoritarian is not a quantitative notion. It does not imply minority (though in practice this may be the case). For example, one 'becoming-minoritarian' that Deleuze and Guattari flag is 'becoming-woman'. Minoritarian is, instead, a qualitative notion - 'not *majoritarian*' in Deleuzian-Guattarian parlance, not the dominant socio-cultural or socio-economic reality. Minoritarian is the Other who is at the margins, is completely or partially overlooked or who is oppressed, whose inclusion in the center would make for greater plurality and accommodation of difference by the 'majoritarian' and thus, in turn, a fairer and more just majoritarian. In principle, this should lead to wider and better democratic representation as well as wider and better distribution of rights that guarantee becomings and thrivings. This excludes Others who seek to totalize and suppress difference and thus thwart the becoming of others. Obvious candidates are racists, terrorists and theocrats who have no interest in facilitating such plural becoming. As Deleuze and Guattari put it, the minoritarian can be:

'...thought of as seeds, crystals of becoming whose value is to trigger uncontrollable movements and deterritorialisations of the mean or majority'.

Deleuze and Guattari (1987: 117)

Minoritarian campaigns and movements have the capacity to change the majoritarian - or as Deleuze and Guattari put it, to “deterritorialize”, to ‘upset the terrain of’ the majoritarian. *One purpose of Deleuzian-Guattarian criticism, and by extension criticism in critical posthumanism, is to identify and amplify such movements.*

It is important to flag that the scope of majoritarian / minoritarian can vary. Majoritarian may be the entire society or it may be a sub-component of it. For example, a religious community in a society might be a minority community. But within its own minority community, some religious leaders may protect and promulgate majoritarian power and discourse which oppresses minoritarian Others within the religious community who would benefit from having their right to flourish openly respected, e.g. homosexuals. Moreover, it is also worth flagging that what looks like a minoritarian Other can be somewhat relative. From the perspective of the majoritarian, a certain high-profile campaign may appear minoritarian. But if this campaign ignores differences amongst its own campaigners, or worse actively suppresses such differences, then a case might be made that such behavior is authoritarian. In other words, just because one is part of the minoritarian, it does not excuse one’s despotism within that minoritarian (Braidotti, 2013b: 350). And, by extension, this also means that the minoritarian should not behave in an authoritarian manner should they succeed in deterritorializing the majoritarian.

3.7.3 *Becoming-animal*

Another ‘becoming-minoritarian’ in *A Thousand Plateaus*, and of relevance to this article’s focus on nonhuman animal testing, is *becoming-animal*. This does not involve ‘a resemblance or analogy to the animal’ exactly (Deleuze and Guattari, 1987: 303).⁶ Rather, in becoming-animal, we destabilize majoritarian-human by integrating aspects of nonhuman animals into our subjectivities. Becoming-animal enables us to appreciate the implicit ideology of ‘speciesism’, i.e., human supremacism over nonhuman animal species (Dunayer, 2001). In this ideology, *human exceptionalism*, our absolute difference from other species (e.g., the capacity to build high speed trains) in conjunction with our significant relative difference from capacities of other species (e.g. while sharing the ability to build shelters with other animals, humans are the only species to make concrete for such construction) is conflated with *anthropocentrism* and *human instrumentalism*, implicitly affording humans the ‘right’ to exploit nonhuman animals. Erasure of nonhuman animal species from discourse, for example via the alternative names of ‘beef’, ‘pork’, ‘venison’, contributes to the propagation of speciesism (Stibbe, 2012).

Having detailed some key orientations of (critical) posthumanism, I now outline the basis of my critical posthumanist pedagogy which draws on these perspectives.

4. A digitally-driven posthumanist pedagogy

4.1 Orientation

4.1.1 “Critical Posthumanism, Digital Data”

Earlier I flagged the title of the module - “Critical Posthumanism, Digital Data” - from which this pedagogy derives. This is a year three undergraduate module that I have taught for two

⁶ See also Braidotti (2009).

years to cohorts of around 20 students. It is delivered over 10 weeks. The module is conceived as a broadly digital (post)humanities module, portable across disciplines, which does not require previous knowledge of text analysis software. It is assessed by a 4,000 word project assignment (already briefly outlined in 1.2 and extensively discussed below). Alongside teaching critical posthumanism, I tutor students in text analysis software (see below) for use in their project. The students use the text analysis software in the sessions to work through model analyses, as well as to create pilot studies, and thus, understand, in a hands-on manner, what is expected of them for the project (see also Section 9). Students are also given a detailed study guide which indicates reading on posthumanism and digital text analysis; they are also provided with a detailed project guide.

4.1.2 Creating a posthuman subjectivity for using as a critical lens on a status quo text(s)

For their assignment, students create a posthuman (ethical) subjectivity which facilitates a broad understanding of an unfamiliar minoritarian campaign seeking the alleviation of human and / or nonhuman suffering and extension of rights. Choice of campaign is the student's but they are expected to select a campaign which is (mostly) unfamiliar to them (see 4.1.4 and 4.1.5). Their posthuman subjectivity is based on digitally analysing a corpus of campaign texts comprehensively compiled from that campaign's website. The student then uses text analysis software to help identify, rigorously and efficiently, key concerns in the campaign. This information is then employed as a subjectivity to evaluate a text or texts which do at least i) below and perhaps also ii) and / or iii):

- i) espouses the status quo which the campaign is seeking to change;
- ii) claims to be ethical in support of the status quo;
- iii) is explicitly inhospitable to the dissenting voices of the campaign.

Because it involves the student identifying with machine-driven data, the subjectivity is posthuman.

To augment the significance of their analysis, students are encouraged to locate a status quo text(s) which is prominent, e.g. because it is in a national/international newspaper, has been retweeted many times, has cultural or political salience (e.g. a text on a government website).

4.1.3 Ways of evaluating the status quo text(s) via the posthuman subjectivity

As I demonstrate in Section 7, the procedures for critically evaluating the status quo text(s) are as follows (Fig.1):

- students use key information from the campaign which they find to be *absent* from the status quo text(s) to problematize this text's framing;
- students may find that categories in the status quo text are *general* / *vague* relative to the more specific categories and concerns of the campaign. When this happens, their critical evaluation of the status quo text opens up these general categories to the specific concerns and foci of the campaign - to its plurality, difference and complexity - thereby potentially complicating and, in turn, deconstructing the text's framing.

Fig.1 Critical procedure in the digitally-driven posthuman pedagogy

In evaluating a status quo text and deconstructing its framing in the way described, students are able to appreciate text which has the capacity to reinforce inequitable relations. I model these two forms of status quo text deconstruction in Section 7. Lastly, in my use of ‘framing’, I echo Robert Entman’s well-known definition:

‘Framing essentially involves selection and salience. To frame is to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described. Typically frames diagnose, evaluate, and prescribe...’
Entman (1993: 52)

Since framing involves selection, by the same token it may involve significant exclusion. The latter might involve omissions which are deliberate and/or inadvertent.⁷

⁷ The roots of the critical posthumanist pedagogy presented here is one aspect of “Posthumanism and Deconstructing Arguments: Corpora and Digitally-driven Critical Analysis” (O’Halloran, 2017). This monograph is, predominantly, a critical dialogue with Critical Discourse Studies, Critical Thinking Studies and (Derridean) Deconstruction for leading to the production of posthumanist approaches to the evaluation of arguments in the

4.1.4 Surprise: the importance of a wide-ranging corpus of unfamiliar campaign texts

It is important that the student casts their ‘data net’ as widely as possible so as to gather all the relevant texts available from the campaign website and/or associated internet material (e.g. the campaign’s twitter feed). That way, they can plausibly claim that their posthuman subjectivity has *representativeness*. That is to say, it is a genuinely wide-angle lens which captures, writ large, the key concerns of the campaign focus rather than being a subjectivity which is based on only a handful of (arbitrarily chosen) texts.

Another important reason for basing their posthuman subjectivity on a comprehensive corpus is that it best ensures the subjectivity is *emergent* rather than pre-figured. The larger the corpus/greater the number of texts within it, and the more unfamiliar the campaign is to the student, the less they can be sure of its key content. This is crucial for the process of decentering since there is then a greater chance that the student is *surprised* by the data results (echoing 3.7.1). In turn, this surprise facilitates decentering of habitual consciousness, potentially also the decentering of humanist consciousness where this has deleterious consequences, bursting of filter bubbles as well as the appreciation of new (for the students) forms of suffering and disadvantage. To assist this process of decentering, there is a section early in the student’s assignment where, before they create a posthuman subjectivity and conduct analysis, they reflect on any knowledge that they might have about the chosen campaign and where they might currently stand vis-à-vis its goals and concerns.

4.1.5 Creating conditions to enhance independent and critical thinking

Generating a posthuman subjectivity creates then a fresh vantage point for thinking with. Since the assignment expects the student to reason, on the basis of evidence, their own position on previously unfamiliar issues, conditions have been created to enhance their independent and

public sphere. The ethically-based posthuman subjectivity of this article is a salient development of one of two types of posthuman subjectivities outlined in the book. This is because the monograph focuses on status quo texts:

- which belong to the text-type of argument. In contrast, the FDA texts of this article are not argumentative but explanatory / informational - explaining to the general public the FDA policy on animal testing and the procedures involved;
- which contain topics related to human affairs. In contrast, the status quo text and posthuman subjectivity of this article relate to nonhuman animals.

There are other things that I do in this article which are not found in the monograph:

- In theorising a posthuman subjectivity in relation to the use of digital text analysis, I draw upon Karen Barad’s notion of *intra-action* and invoke Gilles Deleuze’s concept of *positive difference*;
- For creating a posthuman (ethical) subjectivity, I employ the key semantic domain function of WMatrix;
- I model how data findings can be used to prompt rhizomatically literature searches and thus, in turn, enrichment of a posthuman subjectivity.

The other way of reading detailed in O’Halloran (2017) involves looking at an argument from the perspective of a subjectivity which knows how a topic is commonly spoken or written about. This other way of reading involves using large databases of English (in the billions of words) to ascertain how habitual the discourse of a public sphere argument is in relation to how it frames its topic. Since this subjectivity is associated with common discourse, I refer to it as a *discursive subjectivity*.

critical thinking as well as illuminate and challenge routine critical self. *Fostering independent and critical thinking is the ultimate purpose of the pedagogy.* After putting aside the lenses of their temporary posthuman subjectivities, students critically reflect, in their projects, on what they have learned, on any movements in their thought, on any crystalizing of their thinking on campaign issues where previously it was unformed, and/or which elements of the campaign perspective they might reject - perhaps all elements - furnishing reasons for these developments and their position.

4.2 Text analysis software: WMatrix and its ‘semantic domain’ function

Given the size of the campaign corpus that the student compiles, the use of text analysis software greatly reduces the labor needed to ascertain key concerns in the corpus. The text analysis software that I teach students and employ in this article for building a posthuman subjectivity is WMatrix (Rayson, 2009).⁸ A web-based program, WMatrix has a number of functions. The one that I use in the module is its ‘semantic domain’ analysis. WMatrix automatically groups semantically related words in a text, or corpus of texts, under a larger semantic category. So, for example, WMatrix groups the words, ‘tank’, ‘military’, ‘soldier’ under the larger category, or ‘semantic domain’, WARFARE. WMatrix can do this because it has been programmed to group lexical words under larger semantic categories in accordance with an in-built lexicon.

Why is WMatrix useful for my pedagogy? Students employ WMatrix to find, rigorously, the major semantic domains in:

- i) the corpus of campaign texts;
- ii) the status quo text(s) which the campaign (in)directly opposes.

In a contrastive analysis, students then locate those semantic domains which are recurrent in i) but *absent* or *marginalized* in ii). This conveniently, efficiently and scrupulously sets them up to judge whether there are significant campaign concerns absent from the status quo text(s) which may have ramifications for its credibility relative to the campaign.

WMatrix was developed within the field of corpus linguistics. Some of its functionality - such as its automatic part of speech tagging - reflects its origins. However, the semantic domain function - in effect a “content mining” software - has much wider application across the digital humanities and social sciences. For this reason, as will become apparent, the pedagogy that I model is portable across the digital humanities and social sciences for augmenting independent and critical thinking.⁹

⁸ WMatrix has had wide application in digital linguistics and digital humanities generally. See <http://ucrel.lancs.ac.uk/wmatrix/for> a list of publications which have used this software.

⁹ There are other forms of software used on the “Critical Posthumanism, Digital Data” module. Students are also shown how to use a webscraper to render compilation of web-based text less onerous. The webscraper that I demonstrate is ‘Import.io’ - <https://www.import.io/> [Accessed May 2019].

Students are also taught basic data cleaning, e.g. to remove html and images from web-based data by simple conversion to Plain text (using Microsoft Notepad or Apple TextEdit). Conversion to Plain text (UTF-8 encoding) is necessary, in any case, since this is the preferred format for WMatrix and AntConc. If students use social media data for the construction of a posthuman subjectivity, they are also shown the importance of regularising spelling to ensure that WMatrix can recognise words in the corpus gathered.

4.3 Intra-active and rhizomatic process

4.3.1 Emergent agencies of posthuman subjectivities

The corpus that I explore in Section 6, for purposes of creating posthuman subjectivities, is compiled from the website of the ‘People for the Ethical Treatment of Animals’ (PETA) campaign, which is opposed to animal testing. I employ WMatrix’s semantic domain function to generate the most frequent concerns across this corpus. I then use these concerns as a wide-angle lens on texts from the US Food and Drug Administration’s (FDA) website which explain its pro-animal testing policy and procedures, showing how these status quo texts are problematized (see Fig.1).

In one sense, I am in control of this process: I choose the FDA status quo texts, the PETA website for corpus compilation, load up this data to WMatrix and activate the software. Yet the agency of the posthuman subjectivity that I view the FDA texts through is not exclusively under my control. This is because my critical exploration of the FDA texts is prompted by what WMatrix reveals as statistically significant semantic domains, which I did not know in advance. In this *intra-active* process, the agency of the distributed technologized posthuman subjectivity *emerges* from within a *human/technology assemblage*.

The posthuman subjectivity created is really a collection of subjectivities since, as the reader will see, I use different frequent semantic domains in the PETA corpus which are absent or marginal from the FDA texts to problematize the latter. It follows that, as analyst, I do not have a static subject position. That is to say, my critical subject positions successively differ from previous ones (*positive difference*). This allows me to appreciate and evaluate the FDA texts in continually fresh ways. Since those textual features that I happen upon in the FDA texts to critically engage with are not decided in advance, my critical exploration of these texts is in effect *rhizomatic*. In Section 5, I discuss these FDA texts.

4.3.2 Rhizomatic learning in the assignment

Throughout the different points of their data-directed travel over the status quo text(s), the student is encouraged to allow themselves to be prompted rhizomatically by their unanticipated data findings into researching reputable literature sources to see whether or not perspectives within the campaign corpus can be corroborated. As I show (section 7), this also helps enrich the posthuman subjectivity and, in turn, augment critical appreciation of the status quo text(s).

The assignment of the “Critical Posthumanism, Digital Data” module thus eschews the standard model where students conduct a ‘literature review’ before detailing the methods for their study, and then conducting their investigation and analysis of data. A disadvantage of the standard model is that analytical findings are not used to set in motion further learning in the body of the student’s assignment. In contrast, the module’s ‘rhizomatic pedagogy’ (Section 3.6) fosters, on the basis of unanticipated data findings, unpredictable learning and thus refreshed perspectives.

5. Status Quo Text Data for Critical Examination via Posthuman Subjectivities

5.1 FDA Short text

5.1.1 How the FDA Short text publicly appears

The FDA is responsible for protecting the US public health by ensuring the safety, efficacy, and security of human and veterinary drugs, biological products, and medical devices.¹⁰ A

Fig.2 Screenshot of FDA Short text as it appears on the FDA website

¹⁰ <https://www.fda.gov/default.htm> [Accessed May 2019]

key reason for my choosing the US-based FDA status quo texts is because, as a UK citizen, I was largely ignorant of this organisation and specifically of its guidelines for animal testing. Moreover, while I was familiar with PETA, I did not know in any real detail its perspectives on nonhuman animal testing and especially vis-à-vis testing taking place in the USA. I conjured conditions, then, for extension of my horizons. That is to say, creating posthuman subjectivities from the PETA corpus, and using them as lenses for viewing the FDA texts through, was an opportunity to travel beyond the familiar and refresh my routine critical self, even if, at the end of the process, I might disagree with PETA.

At time of writing (May 2019), the only information on the FDA website explaining why animals are used in testing is a short text of 272 words (henceforth ‘FDA Short text’). A screenshot of how FDA Short text appears on the FDA website can be seen in Fig.2. Since the FDA has a key national role in the USA, I deem FDA Short text to be significant on the matter of animal testing in the USA.

5.1.2 Tracing dominant conceptual framing in FDA Short text

Before critically viewing FDA Short text via a posthuman subjectivity, I need to throw into relief how this text repeatedly conceptually frames ‘animal testing’. I do this by tracing its

Rank	Frequency	Word
1	15	animal(s)
2	13	testing
3	6	medical
4	6	product(s)
5	5	FDA
6	5	device(s)

Table 1 Lexical word frequency list for FDA Short text (floor = 5 words)

most recurrent lexical words and phrases where these contribute to how the FDA Short text conceptually frames ‘animal testing’. Doing so ensures a more rigorous deconstruction of the text’s framing where this might apply. This is because I would then be evaluating demonstrably dominant framings of ‘animal testing’ rather than evaluating what I more loosely perceive, perhaps erroneously, as the text’s major conceptual framings or just engaging, arbitrarily, with some (non-substantive) corner of the text. To take the tedium and error-proneness out of spotting recurrent lexical words and phrases, I throw this task over to WMatrix. Table 1 shows a lexical word frequency list for FDA Short text.

Fig.3 highlights these recurrences in Table 1 across FDA Short text (except for ‘FDA’ since this abbreviation does not conceptually frame ‘animal testing’). As should be clear, repetition of ‘medical product(s)’ / ‘medical devices(s)’ provides a major conceptual framing of the text in relation to ‘animal testing’ (in highlighter in Fig. 3). Lastly, since this tracing is concerned with throwing systematically into relief dominant framings, the focus is less concerned with lexis which contributes to interpersonal communication, e.g., if the lexis is formal or informal.

FDA Short text

[A] Why are **animals** used for testing **medical products**?

[B] **Animals** are sometimes used in the testing of drugs, vaccines and other biologics, and **medical devices**, mainly to determine the safety of the **medical product**.

[C] For drugs and biologics, the focus of **animal testing** is on the drug's nature, chemistry, and effects (pharmacology) and on its potential damage to the body (toxicology). **Animal testing** is used to measure:

- how much of a drug or biologic is absorbed into the blood
- how a **medical product** is broken down chemically in the body
- the toxicity of the **product** and its breakdown components (metabolites)
- how quickly the product and its metabolites are excreted from the body

[D] For **medical devices**, the focus of **animal testing** is on the device's ability to function with living tissue without harming the tissue (biocompatibility). Most devices use materials, such as stainless steel or ceramic, that we know are biocompatible with human tissues. In these cases, no **animal testing** is required. However, some devices with new materials require biocompatibility testing in **animals**.

[E] There are still many areas where **animal testing** is necessary and non-**animal testing** is not yet a scientifically valid and available option. However, FDA has supported efforts to reduce **animal testing**. In addition, FDA has research and development efforts underway to reduce the need for **animal testing** and to work toward replacement of **animal testing**.

[F] When **animal testing** is done to support applications for **medical products** regulated by FDA, manufacturers or sponsors are required to follow FDA's regulation:

<http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?CFRPart=58>

[G] FDA also supports the use of independent **animal** care and use committees (IACUC) for laboratory studies involving **animals**.

Fig.3 Dominant conceptual framings across the Short FDA text on animal testing

5.2 FDA Long text

The reader will see a hyperlink in paragraph [F] of FDA Short text (Fig. 3). This hyperlink is to a much longer text (7537 words) - 'Good Laboratory Practice for Nonclinical Laboratory Studies' (henceforth 'FDA Long text'). Essentially, this is a set of FDA regulations for 'animal testing'. Fig. 4 is a screenshot showing the organisation of the FDA Long text on its first page, which appears once the hyperlink is clicked.

Given the size of FDA Long text, naturally it is more informative on US 'animal testing' than FDA Short text. There is some ambiguity though about its intended audience. On the one hand, it is aimed at laboratory testers, reflected in its formal tone. On the other

TITLE 21--FOOD AND DRUGS
CHAPTER I--FOOD AND DRUG ADMINISTRATION
DEPARTMENT OF HEALTH AND HUMAN SERVICES
SUBCHAPTER A--GENERAL
PART 58 <u>GOOD LABORATORY PRACTICE FOR NONCLINICAL LABORATORY STUDIES</u>
<u>Subpart A--General Provisions</u>
§ 58.1 - Scope.
§ 58.3 - Definitions.
§ 58.10 - Applicability to studies performed under grants and contracts.
§ 58.15 - Inspection of a testing facility.
<u>Subpart B--Organization and Personnel</u>
§ 58.29 - Personnel.
§ 58.31 - Testing facility management.
§ 58.33 - Study director.
§ 58.35 - Quality assurance unit.
<u>Subpart C--Facilities</u>
§ 58.41 - General.
§ 58.43 - Animal care facilities.
§ 58.45 - Animal supply facilities.
§ 58.47 - Facilities for handling test and control articles.
§ 58.49 - Laboratory operation areas.
§ 58.51 - Specimen and data storage facilities.
<u>Subpart D--Equipment</u>
§ 58.61 - Equipment design.
§ 58.63 - Maintenance and calibration of equipment.
<u>Subpart E--Testing Facilities Operation</u>
§ 58.81 - Standard operating procedures.
§ 58.83 - Reagents and solutions.
§ 58.90 - Animal care.
<u>Subpart F--Test and Control Articles</u>
§ 58.105 - Test and control article characterization.
§ 58.107 - Test and control article handling.
§ 58.113 - Mixtures of articles with carriers.
<u>Subpart G--Protocol for and Conduct of a Nonclinical Laboratory Study</u>
§ 58.120 - Protocol.
§ 58.130 - Conduct of a nonclinical laboratory study.
Subparts H-I [Reserved]
<u>Subpart J--Records and Reports</u>
§ 58.185 - Reporting of nonclinical laboratory study results.
§ 58.190 - Storage and retrieval of records and data.
§ 58.195 - Retention of records.
<u>Subpart K--Disqualification of Testing Facilities</u>
§ 58.200 - Purpose.
§ 58.202 - Grounds for disqualification.
§ 58.204 - Notice of and opportunity for hearing on proposed disqualification.
§ 58.206 - Final order on disqualification.
§ 58.210 - Actions upon disqualification.
§ 58.213 - Public disclosure of information regarding disqualification.
§ 58.215 - Alternative or additional actions to disqualification.
§ 58.217 - Suspension or termination of a testing facility by a sponsor.
§ 58.219 - Reinstatement of a disqualified testing facility.

Fig.4 The section organisation of the FDA Long text

hand, it appears on the FDA website as a link within a text targeted at the general US public. That is to say, it can also be viewed as furnishing public understanding of the testing of nonhuman animals. Given the size of FDA Long text, it is beyond the scope of this article to examine it all. Instead, where quantitative results from analysing the PETA corpus prompt me to probe *a particular section* of the FDA Long text, I then trace this section's dominant lexical framing.

6. Using Text Analysis Software to Explore the PETA Corpus

6.1 Orientation: PETA animal testing corpus

As I said, the posthuman subjectivities are created from a corpus analysis of texts from the *People for the Ethical Treatment of Animals* (PETA) website.¹¹ PETA, a global organisation, one of the largest protest and campaigning groups for animal rights and welfare, was set up in 1980 by Ingrid Newkirk. It is based in Norfolk, Virginia and as of May 2019 has ‘more than 6.5 million members and supporters’. Its motto is “Animals are not ours to eat, wear, experiment on, use for entertainment, or abuse in any other way”. PETA is the largest US campaign group against nonhuman animal testing (and other uses of nonhuman animals). As the FDA is a US agency, I regard, as an appropriate choice, a corpus of texts from the US PETA website for creating posthuman subjectivities from. The PETA website organizes its text content under ‘issues’. One key issue is ‘animals used for experimentation’.¹² In April 2019, I aggregated all texts located under this sub-category.¹³ In total, there were fifty-six texts which amount to 35, 275 words.

Since the topics and campaigns chosen by the students for their projects differ from one another, every student campaign corpus varies in size and content. Echoing 4.1.4, the key criterion for judging a corpus is *representativeness* rather than size. For example, a corpus of all communication on Twitter made by a campaign will be relatively small given the size of tweet texts but it would, all the same, be representative of the campaign’s tweeting. The important thing, then, is to accumulate as many texts / voices as possible - so that the posthuman subjectivities that are created have representativeness and quantitative authority and thus can be considered as credible wide-angle critical lenses. I collated *all* fifty-six texts on animal testing from the PETA website, ensuring that the corpus was, at time of compilation, representative of what the PETA website has to say about animal testing.

6.2 Semantic domain analysis using WMatrix

6.2.1 Key semantic domains

Fig.5 is a visualisation generated by WMatrix of key semantic domains for the PETA ‘animal testing’ corpus.¹⁴ ‘Key’ means that these are semantic domains which are unusually frequent relative to the semantic domains in a norm of English usage which WMatrix uses for contrast. This norm - known as a ‘reference corpus’ - consists of a balanced corpus of 1 million words of texts from different genres.¹⁵

¹¹ <https://www.peta.org/> [Accessed May 2019]

¹² <https://www.peta.org/issues/animals-used-for-experimentation/> [Accessed May 2019].

¹³ The process can be completed manually. For ease, I used a webscraper, *Import.io* <https://www.import.io/> [Accessed May 2019].

¹⁴ All text data needs first to be converted to Plain text since this is the format that WMatrix works with. This can be done easily by copying and pasting into Microsoft Notepad, Apple TextEdit etc.

¹⁵ Since the FDA text uses American English, I use as my norm the American English corpus (AmE06) that WMatrix has access to. This consists of 1 million words of texts from a balanced number of different genres which were published in the USA in 2006. Each text in AmE06 is around ‘as close as possible to 2,000 words to the nearest complete sentence’. Moreover, ‘all texts [in AmE06] have hard copy publication years between 2004 and 2008, with year and frequency as follows: 2004 (1 text), 2005 (48 texts), 2006 (400 texts), 2007 (45 texts), 2008 (6 texts), or 80% from 2006, and 98.6% 2005-2007’ (Potts and Baker, 2012: 302). Since the overwhelming majority of the texts were published in 2006, this explains the name of the corpus.

In order to establish ‘keyness’, two metrics are needed.¹⁶ We first need to know the ‘effect size’ – the size of the frequency difference of a semantic domain in the study corpus (here the PETA corpus) as compared with the same semantic domain in the reference corpus. WMatrix calculates ‘effect size’ on a number of different metrics. Following Gabrielatos (2018), I have use the effect size metric %DIFF. This straightforward metric indicates the proportion (%) of the difference between the normalized frequencies of a semantic domain both in the study corpus and the reference corpus.¹⁷

Once %DIFF values for semantic domains are calculated, next we need to know if they are dependable. The second metric - log likelihood (LL) - establishes which %DIFF values are statistically significant and thus reliable.¹⁸ In WMatrix, a log likelihood value of ≥ 7 is statistically significant ($p < 0.01$).¹⁹ So if a semantic domain in a text has a relatively high %DIFF value and has a log likelihood value of ≥ 7 , then we can depend on it being a key semantic domain.²⁰

Fig.5 is a key semantic domain ‘cloud’ visualisation for the PETA corpus based on %DIFF values which have a log likelihood of ≥ 7 . A raw numerical frequency threshold of 10 was also set to make the number of findings manageable. The larger the typeface of the key semantic domain, the larger is its ‘keyness’. The cloud visualisation, then, offers a neat overview of key semantic domains and their relative statistical frequency. But such a handy visualisation, naturally, restricts how much quantitative information is displayed. WMatrix also provides comprehensive tables showing %DIFF, log likelihood and frequency values for key semantic domains. In the appendix, Table 6 provides a quantitative tabulated version of Fig.5.

6.2.2 Targeted and non-arbitrary critical text analysis

A great advantage of WMatrix’s (key) semantic domain functionality, particularly for a pedagogy, is that it can be used to target conveniently and rigorously significant concerns across a corpus of campaign texts that would be far more onerous to identify manually given the size of the corpus. Since I will also perform a key semantic domain analysis of FDA text data, this means I am able to target, efficiently, statistically frequent concerns in the PETA corpus which are *absent* from or *marginal* within the FDA text data (see Sections 7 and 8). Another important advantage of WMatrix is that it targets key concerns in a non-arbitrary manner. By definition, key semantic domains are statistically frequent, thus providing a rationale for the analyst to focus on them. In turn, all this facilitates non-arbitrary and thus, in principle, rigorous deconstruction of the FDA text data where this is appropriate.

¹⁶ See Gabrielatos (2018) on the need to use an effect size metric *and* a statistical significance metric for calculating keyness.

¹⁷ %DIFF is calculated as follows:

$$\%DIFF = \frac{(NF \text{ in } SC - NF \text{ in } RC) \times 100}{NF \text{ in } RC}$$

NF = normalised frequency
SC = Study Corpus
RC = reference corpus.

¹⁸ See Dunning (1993) on Log likelihood.

¹⁹ $p < 0.01$ indicates that there is a 1% chance that we would obtain the same or a larger frequency difference when, in reality, no such difference exists.

²⁰ There is no conventional cut-off value for %DIFF. For example, a 50% difference is relatively small if most values are larger than 200%, but large if most values are smaller than 20%.

6.3 Experimenting in the construction of posthuman subjectivities

By contrasting the much shorter FDA texts with a corpus of 35, 275 words, there will obviously be key semantic domains in the PETA corpus which are absent from the FDA texts. It is important, then, that the analyst probe for *meaningful* and, for them, novel and unpredictable absences. Some key semantic domains will not be of much interest since they reflect predictable agendas. For example, the DAMAGING_DESTROYING key semantic domain present in the PETA corpus is absent from the FDA texts. The lexis under this key semantic domain, such as ‘killed’ and ‘poisoned’, highlights that nonhuman animals are exterminated in testing. This hardly comes as a surprise as something that PETA would emphasize, but that the FDA texts would not.

The crucial point I am making, and echoing a critical posthumanist ethos (Section 3.2), is that I need to *experiment* with different key semantic domains to discover the following: novel (for me) compelling insights about what is absent/marginal from the FDA texts relative to the PETA corpus which, in turn, unpredictably (for me) problematize the framing of the FDA texts whilst extending my knowledge and horizons.

In Section 7, I move to exploring the implications for the credibility of the FDA texts, relative to PETA, from key semantic domains which are *present* in the PETA corpus but which are *absent* from the FDA texts.

7. Critically Viewing the FDA Texts Via Posthuman Subjectivities Created from Software Analysis of the PETA Corpus

7.1 FDA Short text

7.1.1 Testing tobacco products on nonhuman animals

Fig.6 shows the key semantic domains for FDA Short text (as does Table 7 quantitatively in the appendix):

Fig.6 Key semantic domains for the FDA Short text; generated by WMatrix filtering for ‘overused items’ on the effect size metric %DIFF and filtered for Log Likelihood ≥ 7

One key semantic domain *present* in the PETA corpus (Fig.5), but *absent* from FDA Short text (Fig.6) is SMOKING_and_NON-MEDICAL_DRUGS. Clicking on this key semantic domain in the Fig.5 visualisation takes me to the words grouped under this semantic domain such as ‘tobacco’, ‘cigarette’ (Table 2). Subsequently clicking on the ‘concordances’ for these words takes me to the linguistic contexts for each of these terms. I encounter PETA’s

Word	Frequency
tobacco	38
cigarette	17
smoking	9
cigarettes	8
nicotine	4
tobacco_companies	4
addicted	3
smokers	3
drug_addiction	1
cigars	1
drugged	1

Table 2 Frequencies for words under the key semantic domain SMOKING_and_NON-MEDICAL_DRUGS

repeated questioning of why the FDA allows new brands of tobacco to be tested on animals even though it is common knowledge that smoking is detrimental to human health, e.g.:

To quote the National Cancer Institute, “There is no safe **tobacco** product.” We already know from clinical research—and from basic common sense—that smoking is bad for us.

[...]

If the **tobacco** industry wants to continue developing and marketing products that cause addiction and kill people, it should do so without the help of the government and without harming animals. You can write to the FDA and request that it follow the lead of agencies in progressive countries by banning **tobacco** product and ingredient tests on animals.

That animals are still used for what would, indeed, seem to be superfluous cigarette testing was new information for me. But one cannot just automatically assume that the campaign information is accurate that tobacco products are still tested on animals in the USA. That is to say, once students have ascertained fresh insight into the status quo text(s) from the campaign corpus, they should see if it can be *corroborated*.

I probed the websites of significant US tobacco companies. At time of writing, the giant American multinational cigarette company Philip Morris International - maker of ‘Marlboro’ - is transparent that they use animals for what they refer to as ‘limited’ testing.²¹ Altria, the parent company of Philip Morris International, and owner of other companies which make cigarettes and cigars (US Smokeless Tobacco Co, John Middleton, Nat Sherman) is open about its use of animals for ‘necessary’ testing.²² I could find no information on the animal testing policy of the other American giant cigarette company, R.J. Reynolds.²³ However, its

²¹ <https://www.pmi.com/our-business/about-us/standards/scientific-research> [Accessed May 2019]

https://www.pmi.com/resources/docs/default-source/our_company/product-assessment_v2.pdf?sfvrsn=164e8bb5_2 [Accessed May 2019]

²² http://www.altria.com/harm-reduction/conducting-the-science/Pages/Animal_care_Use_Statement.aspx [Accessed May 2019]

²³ <https://www.reynoldsamerican.com> [Accessed May 2019].

parent company, British American Tobacco, indicates that it uses animal testing ‘where there is no recognised alternative’.²⁴ (None of the companies mentioned is explicit, however, about the numbers of animals used for testing in a particular period and so it is difficult to ascertain what ‘limited’ etc specifically means).

7.1.2 Deconstructing Figure 3

With this information from the PETA corpus corroborated, I can now move to deconstruction of the FDA Short text. The information places pressure on the recurrent ‘*medical* product’ testing framing in FDA Short text (Fig.3) since: i) tobacco patently is a *leisure* product and ii) its testing on nonhuman animals is redundant.

I have performed one evaluation and deconstruction of text framing relative to a statistically significant presence in the PETA corpus which is absent from the FDA Short text. Given its greater size, the remainder of the deconstructions in Section 7 concentrate on the FDA Long text whilst looping back to the FDA Short text where appropriate.

7.2 FDA Long text

7.2.1 Contrasting Fig.5 and Fig.7

The key semantic domains for FDA Long text can be seen in the Fig.7 visualisation as well as in Table 8, which shows explicit quantitative information (see appendix).

²⁴ https://www.bat.com/group/sites/UK_9D9KCY.nsf/vwPagesWebLive/DO52ANF5 [Accessed May 2019].

Fig.7 Key semantic domains for the FDA Long text; generated by WMatrix filtering for ‘overused items’ on the effect size metric %DIFF and filtered for Log Likelihood ≥ 7

Let me now ascertain significant key semantic domains *present* in the PETA corpus (Fig.5) which are *absent* from or *marginal* within FDA Long text (Fig.7). Given the larger number of key semantic domains for the FDA Long text than the Short text, I facilitate this contrast in Fig.8 through the following:

- juxtaposing key semantic domains, for the two data sets, in order of keyness (see Tables 6 and 8 in the appendix);
- indicating, with highlighter, key semantic domains *present* in the PETA corpus which are *absent* from the FDA Long text;
- indicating, with italics, key semantic domains *present* in FDA Long text which are *absent* from the PETA corpus;
- indicating, through no highlighting, key semantic domains which are *common to both* the PETA corpus and FDA Long text.

PETA corpus: key semantic domains

Smoking and non-medical drugs
 Living creatures: animals, birds, etc.
 Substances and materials generally
 Science and technology in general
 Medicines and medical treatment
 Using
 Education in general
 Health and disease
 Safe
 Danger
 Disease
 Investigate, examine, test, search
 Not allowed
 Knowledge
 Sad
 Suitable
 Mental object: Means, method
 Cleaning and personal care
 Life and living things
 Green issues
 Dead
 Allowed
 Evaluation: Good/bad
 No obligation or necessity
 People
 Industry
 Money and pay
 Damaging and destroying
 Inclusion
 Helping
 Unmatched
 Information technology and computing
 Measurement: General
 Change
 No constraint
 Cause&Effect/Connection
 Quantities: many/much
 The Media
 Anatomy and physiology
 Alive
 Frequent
 Degree: Non-specific
 Business: Selling
 Violent/Angry
 Hindering
 Giving
 Numbers
 Comparing: Usual

FDA Long text: key semantic domains

Non-commercial
Exclusion
Participating
Knowledge
 Education in general
 Suitable
 Evaluation: Good/bad
Part
 Science and technology in general
Useful
 The Media
Time: Future
Architecture, houses and buildings
 Allowed
Paper documents and writing
Evaluation: Unauthentic
 Mental object: Means, method
 Medicines and medical treatment
Evaluation: Accurate
Time: Momentary
Frequency
 Substances and materials generally
Food
 Investigate, examine, test, search
Evaluation: Authentic
Entire; maximum
 Giving
 Using
No power
In power
 Inclusion
 Numbers
General actions /making
 Living creatures: animals, birds, etc.
Detailed
Law and order
Getting and possession
 Cause&Effect/Connection
Speech acts
Grammatical bin

Wanted
Quantities
Comparing: Different
Objects generally

Fig.8 Contrasting the key semantic domains in the PETA corpus and FDA Long text; for both columns, semantic domains are in order of %DIFF value for $LL \geq 7$ from high to low; key semantic domains which are darkly highlighted in the left column are unique to the PETA corpus; key semantic domains which are lightly highlighted in the right column are unique to FDA Long text; non-highlighted key semantic domains are common to both the PETA corpus and FDA Long text.

7.2.2 Absence of references to testing tobacco in FDA Long text

The semantic domain SMOKING_and_NON-MEDICAL_DRUGS is absent from FDA Long text just as it is with FDA Short text. Similar to FDA Short text, phrases with ‘medical’ are repeated in FDA Long Text, e.g., ‘medical device(s)’ (x7). Yet, there is no mention once again of tobacco, specifically, nor of ‘legal leisure drugs’ or similar, more generally, being tested on animals which, just as with FDA Short text, reveals the lack of adequate breadth of framing from repeated use of ‘medical device(s)’.

7.2.3 Suffering before animal testing I: removal from habitat

Next I focus on the key semantic domain LIVING_CREATURES:_ANIMALS_BIRDS_etc. While this is the *second* key semantic domain in the PETA corpus, it is only the *thirty-fourth* most frequent key semantic domain in FDA Long text (both key semantic domains are linked by a line in Fig.8). Table 3 shows the individual words under this semantic domain in FDA Long text. As should be clear, mostly the FDA Long text uses the general term ‘animal(s)’, but no particular species or genera of animals (‘rodents’ being an order not a species).

Word	Frequency
animal(s)	37
animal_rooms	2
microorganism	1
vermin	1
animal_room	1
veterinary	1
rodents	1

Table 3 FDA Long text: words within the key semantic domain, LIVING_CREATURES:_ANIMALS_BIRDS_etc

The almost exclusive use, in FDA Long text, of the general term, ‘animal(s)’, as opposed to individual species or genera, can be seen particularly in the section (‘Section 58.90’) called ‘Animal Care’ (Fig.9). That is to say, the category ‘animal(s)’ provides a dominant conceptual framing of Section 58.90 on animal care:

Sec. 58.90 Animal Care.

- (a) There shall be standard operating procedures for the housing, feeding, handling, and care of **animals**.
- (b) All newly received **animals** from outside sources shall be isolated and their health status shall be evaluated in accordance with acceptable veterinary medical practice.
- (c) At the initiation of a nonclinical laboratory study, **animals** shall be free of any disease or condition that might interfere with the purpose or conduct of the study. If, during the course of the study, the **animals** contract such a disease or condition, the diseased **animals** shall be isolated, if necessary. These **animals** may be treated for disease or signs of disease provided that such treatment does not interfere with the study. The diagnosis, authorizations of treatment, description of treatment, and each date of treatment shall be documented and shall be retained.
- (d) Warm-blooded **animals**, excluding suckling rodents, used in laboratory procedures that require manipulations and observations over an extended period of time or in studies that require the **animals** to be removed from and returned to their home cages for any reason (e.g., cage cleaning, treatment, etc.), shall receive appropriate identification. All information needed to specifically identify each **animal** within an **animal**-housing unit shall appear on the outside of that unit.
- (e) **Animals** of different species shall be housed in separate rooms when necessary. **Animals** of the same species, but used in different studies, should not ordinarily be housed in the same room when inadvertent exposure to control or test articles or **animal** mixup could affect the outcome of either study. If such mixed housing is necessary, adequate differentiation by space and identification shall be made.
- (f) **Animal** cages, racks and accessory equipment shall be cleaned and sanitized at appropriate intervals.
- (g) Feed and water used for the **animals** shall be analyzed periodically to ensure that contaminants known to be capable of interfering with the study and reasonably expected to be present in such feed or water are not present at levels above those specified in the protocol. Documentation of such analyses shall be maintained as raw data.
- (h) Bedding used in **animal** cages or pens shall not interfere with the purpose or conduct of the study and shall be changed as often as necessary to keep the **animals** dry and clean.
- (i) If any pest control materials are used, the use shall be documented. Cleaning and pest control materials that interfere with the study shall not be used.

Fig.9 Recurrent framing of ‘animal’ in the ‘Animal Care’ section of FDA Long text

Having established that FDA Long text refers, in the main, to tested animals using the general category ‘animal(s)’, and particularly in its ‘Animal Care’ section, let me now contrast with the categories that the PETA Corpus uses under the LIVING_CREATURES:_ANIMALS_BIRDS_etc semantic domain. As Table 4 shows, the PETA corpus too contains a relatively high number of the category ‘animal(s)’.

Word	Frequency	Word	Frequency
animal(s)	650	amphibians	6
non-animal	158	goats	6
mouse / mice	74	sheep	6
rabbit(s)	56	kittens	5
dogs	33	frogs	4
monkey(s)	30	rhesus	4
primate(s)	26	foals	3
cats	25	baboons	2
pig(s)	21	chickens	2
guinea_pig(s)	19	mares	2
birds	15	turtles	2
rodent(s)	14	apes	1
fish	11	beagles	1
hamsters	10	bunnies	1
horse(s)	8	elephants	1
ferrets	7		

Table 4 PETA corpus: words within the key semantic domain, LIVING_CREATURES:_ANIMALS_BIRDS_etc,

But, in sharp dissimilitude from FDA Long text, the PETA corpus also comprises numerous specific *animal types*, including species such as guinea pigs (x19), genera such as mouse/mice (x74), orders such as primate(s) (x26) and classes such as birds (x15). By searching specific animal types from Table 4 in the PETA corpus, the user comes across the repeated point that the healthy mental state of different species, genera, orders, families and classes is dependent on being entangled with their natural environments. Here, for example, is some discussion on this found from searching on ‘primates’:

In nature, many primates, including rhesus macaques and baboons, stay for many years or their entire lives with their families and troops. They spend hours together every day, grooming each other, foraging, playing, and making nests to sleep in each night. But in laboratories, primates are often caged alone. Laboratories often do not allow social interactions, provide family groups or companions, or offer grooming possibilities, nests, or surfaces softer than metal. [...]

The complete lack of environmental enrichment and the stress of their living situation cause some animals to develop neurotic types of behavior such as incessantly spinning in circles, rocking back and forth, pulling out their own fur, and even biting themselves.

I now have information from the PETA corpus which I can use as a posthuman subjectivity for potential deconstruction of the ‘animal(s)’ framing in FDA Long text and especially in relation to its section on ‘Animal Care’ (Fig.9). Before doing this, however, I investigate whether the PETA position can be substantiated.

7.2.4 “Extended phenotype”: enriching the posthuman subjectivity through rhizomatic learning

Echoing Sections 3.6 and 4.3.2, I allowed myself to be prompted by these data findings to seek possible corroboration in literature researches. In turn, any corroboration would both expand my knowledge and substantiate/enrich the above posthuman subjectivity. One piece of literature relevant to the extract above from the PETA corpus is Richard Dawkins’ concept of

the *extended phenotype* (Dawkins, 1982). For Dawkins, the genotype of a species (i.e., its genes) does not just give rise to a body (phenotype) but also to the species' habitat (extended phenotype) such as an Emperor penguin's nest, or North American beaver's dam. A species' habitat is not some incidental add-on to its life. Rather *to be a species is, in part, to produce and be entangled with a habitat*. Dawkins thus extends the idea of the phenotype. Indeed, for him, there is a direct relationship between a species' extended phenotype and natural selection. Those animals capable of creating habitats which facilitate their survival and sexual reproduction must have been selected for. So, an extended phenotype must play a key role in helping to propagate genes:

‘...an animal artefact, like any other phenotypic product whose variation is influenced by a gene, can be regarded as a phenotypic tool by which that gene could potentially lever itself into the next generation.’
Dawkins (1982: 199)

Hunter (2018) reports that Dawkins' extended phenotype idea has been generative in recent biology, having:

‘...opened up a huge field of investigation to include concepts such as evolutionary feedback and niche construction theory into a so-called integrated theory of evolution.’
Hunter (2018: 1)

This has proved possible because of recent:

‘...next-generation sequencing and molecular techniques that allow the study of relationships between genomes and phenotypes among organisms at a much finer level.’
Hunter (2018: 1)

To conclude: the most natural thing for a species is to build its habitat in order to assist its survival and, crucially, sexual reproduction. Since *to be an animal is, in part, to be entangled with a habitat*, an animal is *not living* if it is not in a position to build its habitat. Dawkins' idea of the extended phenotype, and its wide endorsement in contemporary biology, provides support for PETA's viewpoint that a normally functioning species - and thus a mentally healthy species - should not be thwarted from its natural instinct to create its own habitat.

7.2.5 Deconstructing Figures 9 and 3

I have now an enriched perspective on use of the category ‘animal(s)’ in FDA Long text and especially in relation to its section on ‘Animal Care’ (Fig.9). Whether intentionally or not, the **generality** of ‘animal(s)’ at the *kingdom* level of biological classification’:

- obscures plurality and difference across the tested species;
- obscures understanding that a particular species' mental health is dependent on being entangled with its particular extended phenotype.

The ‘Animal Care’ section does not mention that different species are allowed to build their habitats, so I now see that application of ‘care’²⁵ is somewhat limited. Lastly, it is worth highlighting too that use of the general category ‘animal’ in Fig. 9 curtails the reader's imagining of what might happen in the laboratory testing to ‘cats’, ‘rabbits’ and so on.

²⁵ ‘The provision of what is necessary for the health, welfare, maintenance, and protection of someone or something’ <https://en.oxforddictionaries.com/definition/care> [Accessed May 2019]

FDA Short text (Fig. 3) can similarly be deconstructed with this enriched posthuman subjectivity. Consider the following from FDA Short text:

[G] FDA also supports the use of independent **animal** **care** and use committees (IACUC) for laboratory studies involving **animals**.

Once more, relative to what I found out from the PETA corpus and literature searches, there is an absence of ‘care’ towards laboratory animals to allow them to create their extended phenotype. Moreover, the same insights into the *kingdom* level of ‘animal’ in Fig.9 apply to the above.

7.2.6 Suffering before animal testing II: capture, transportation, maternal deprivation

SAD is another key semantic domain *present* in the PETA corpus which is *absent* from both the FDA Short and Long texts. Table 5 shows the most common words under this field in the PETA corpus:

Word	Frequency
suffering	57
suffer	31
trauma	22
sadly	2
depression	1
languish	1
misery	1
suffered	1
tragedy	1
tragic	1
upsetting	1

Table 5 Words within the SAD key semantic domain in the PETA corpus

A text endorsing ‘animal testing’, naturally, will not wish to highlight the attendant suffering of nonhuman animals. So, the fact that the SAD domain is absent from the FDA Long text is predictable. What *is* interesting here is what specific lexical instances of the key semantic domain SAD in the PETA corpus, and their contexts, point to. Exploring the linguistic contexts for the words in Table 5, we find another form of ‘suffering’ which goes beyond the actual testing, e.g.:

... a comprehensive view of the situation for animals in laboratories should take into account the totality of the **suffering** imposed on them, including the stress of capture, transportation, and handling; [...]; and the physical and psychological stress experienced by animals used for breeding, who endure repeated pregnancies, only to have their young torn away from them, sometimes immediately after birth.

Several other snippets of text discussing these sorts of sufferings could also have been furnished.

7.2.7 Deconstructing Figure 9

Once again, this information complicates the FDA Long text. In its ‘Animal Care’ section (Fig.9), paragraph (b) is as follows (see 7.2.3):

- (b) All newly received **animals** from **outside sources** shall be isolated and their health status shall be evaluated in accordance with acceptable veterinary medical practice.

Via the lens of this posthuman subjectivity, I appreciate how **general** the phrase ‘outside sources’ is in not accounting for the specificities of capture and transportation of nonhuman animals intended for laboratory testing, and nor for whether these animals receive sufficient care during capture and transportation. Moreover, in relation to earlier in Section 7, I appreciate too the suffering emanating from the animals’ extraction from, and inability to maintain, their extended phenotype. I am also alerted to the lack of any information in the ‘Animal Care’ section of FDA Long text (Fig. 9) on care of animals who come from ‘*inside sources*’, born in the laboratory because an animal was already pregnant or for purposes of testing, as well as the lack of information on care of mothers. Yet more absences. In effect, what I have done here is open up a category, ‘outside sources’, whose **generality** I did not previously appreciate, to plurality and differences (new to me) which in turn complicate the picture presented in the FDA Long text on animal care relative to PETA animal welfare concerns.

8. Reflection

8.1 My rhizome

One way of looking at what I did is to say that I created three posthuman subjectivities. Another is to say that I created one posthuman subjectivity which is multiple, internally differentiated and thus non-unitary, echoing the Braidotti (2013a: 190) quotation in 3.7.1. Fig.10 shows my non-unitary posthumanist subjectivity and a map of the rhizomatic journey around the FDA texts that I took. This was the result of intra-actions between myself and the statistically significant data generated from software analysis of the PETA corpus. The posthuman subjectivity was emergent since new subject positions materialized from my experiments with software results. Through staged institution of positive difference, I could evaluate the FDA texts in continually fresh ways. With more space available, I could keep reading the FDA texts via the contrastive key semantic domain analysis and thus further grow my posthuman subjectivity.

Fig.10 My rhizomatic journey around the FDA texts

8.2 Extensions

8.2.1 *Other possibilities for my posthuman subjectivity*

Other choices of key semantic domains would have led to different non-unitary posthuman subjectivities being created which, in turn, could have led to different sequenced deconstructions of the FDA text framings that I focused on - or, indeed, deconstructions of different FDA text framings from those I looked at. A longer project such as a 10,000 word undergraduate dissertation would afford greater space to create an even more representative posthuman subjectivity. For example, I could also have created a corpus of PETA supporter comments on social media where 'animal testing' is discussed, and then combined this with the PETA corpus. That is to say, the posthuman subjectivity would be based on sub-corpora rather than a single corpus. Moreover, if the status quo text(s) to be critically engaged with has more global implications for nonhuman animal testing than the US-based texts of this article, then this would have necessitated the construction of a more comprehensive posthuman subjectivity gathered from nonhuman animal rights and welfare websites across the world.

8.2.2 *Critically reflecting on the campaign and on the student's original position*

As I wrote in 4.1.5, the ultimate goal of spawning a posthuman subjectivity is, via creation of a fresh vantage point for thinking with, to foster the conditions for students to grow independent and critical thinking as well as to irradiate and interrogate routine critical self. Reflecting this ethos, there is an expectation towards the end of the assignment that the student reasons out, on the basis of the evidence they have found, a position on heretofore unfamiliar issues.

In relation to the topic of this article and its data generation, imagine a student whose starting point had been pro-animal testing. While they may remain convinced that testing new medicines on animals is justifiable where no alternatives exist, all the same they might now be moved to support better animal welfare for transportation and laboratory care, as well as the banning of redundant animal testing of tobacco. Or, perhaps this student goes much further and joins PETA. I should be clear, though, that *creating a posthuman (ethical) subjectivity does not necessarily, and nor should it automatically, translate into political alignment with a campaign or (all of) its tactics.*²⁶ Procedure here is somewhat analogous to a VR immersive experience designed to engender empathy for the particular focus of a charity etc; the time comes to remove the headset and reflect on alignments or actions that might ensue - if any. If the above student did join PETA (entirely their choice), or reject the campaign entirely, after putting aside their posthuman subjectivity they should indicate their reasons for their position in their assignment.

A key ethos of the module is appreciating the value of (quantitative) evidence in contrast to vague or speculative claims. The module impresses upon the students the importance of seeking relevant (quantitative) evidence for seemingly ethically-based claims made by organisations which campaigns oppose. For example, I found (Section 7.1) that while major US tobacco companies all say that they use animals for 'limited', 'necessary' etc testing,

²⁶ The student can also demonstrate independent thinking by providing reasons for where they agree or disagree with the campaign's tactics. In relation to the focus of this article, a student may concur, for example, with certain criticisms made of PETA's use of nudity, even by fellow animal rights supporters. <https://www.theguardian.com/commentisfree/2017/jul/07/breasts-peta-women-strawberries-and-cream-wimbledon-animals> [Accessed May 2019].

In further demonstration of independent thinking, students might suggest improvements to the campaign regardless of whether they agreed or disagreed with it.

they do not indicate the numbers of animals they currently use; nor do they indicate the numbers of animals that they used before animal testing became limited. It is impossible then to assess what 'limited' etc really means. Indeed, without such quantitative evidence, 'limited' etc would appear to be strategically vague choices of expression whether this is intentional or not.

8.3 Limitations of my posthuman subjectivity

Just because PETA espouses nonhuman animal rights, this does not mean its literature is free of humanist language, i.e., language which reflects anthropocentrism. Let me take as my cue the anthropocentric expression 'animal testing' in the FDA Short text and explore if this expression exists in the PETA corpus. ('Animal testing' is anthropocentric since humans are also animals; from a critical posthumanist perspective 'animal testing' should really be 'nonhuman animal testing').

Surprisingly, there are seventy-one instances of 'animal testing' in the PETA corpus, but only one instance of 'nonhuman animal' where testing is discussed. Also, taking as my cue the anthropocentric 'the body' from FDA Short text, I probed whether the PETA corpus carried this usage when it is understood to be a human body. There are 18 instances of 'body' in the PETA corpus. As Fig.11 reflects, sometimes an explicitly 'human body' is referred to (x6). At other times, anthropocentrism is more evident in instances of 'the body' (x10) via the absence of the modifier 'human'. One might object that, where it is understood that the human body is being discussed, the modifier 'human' can surely be dropped. Yet these are texts generated by PETA which seeks a decentering of human consciousness towards the suffering of nonhuman animals. That PETA's language use echoes anthropocentrism, and thus humanism, is in tension with this decentering.

This is, it must be admitted, hardly a comprehensive survey of humanist language in the PETA corpus. All the same, there would seem to be limits to the 'becoming-animal' of PETA. And, since trying to read a text as an assemblage of human and machine-generated data can be challenging, conversely the posthumanist readings of this article, like any other such readings, are potentially vulnerable to being deconstructed for remnants of humanism.

Fig.11 Concordance for 18 instances of ‘body’ in the PETA corpus

I turn now to reflecting on my teaching of the “Critical Posthumanism, Digital Data” module.

9. “Critical Posthumanism, Digital Data”: some reflections on teaching the module

9.1 Ethos of freedom and horizon extension

In their end of course evaluations, students report that they appreciate the module’s ethos of freedom. That is to say, they welcome the liberty to create their own project focus, the opportunity to extend their horizons by acting nomadically on the web and generate posthuman subjectivities of their choice, as well as the freedom to criticize their chosen campaign where they have good reasons to. The freedom of choice for the project has led to a diverse range of topics. Here is a sample of project titles:

The voices behind #MeToo and the anti-sexual harassment movement: using a posthuman subjectivity to deconstruct the Daily Mail’s oppositional editorial;

Creating a posthuman subjectivity from Voices Opposing the Dakota Access Pipeline: Deconstructing a Chicago Tribune Editorial supporting the pipeline;

Using a corpus-driven digital analysis to deconstruct Piers Morgan’s representation of the Black Lives Matter campaign;

Using a posthuman subjectivity of environmentally conscious voices to deconstruct Tesco’s (UK supermarket) environmental sustainability reports;

The Tampon Tax debate: using a posthuman subjectivity to deconstruct (prominent UK journalist) Julia Hartley-Brewer's argument attacking the standpoint of campaigners calling for the removal of VAT on sanitary products.

9.2 Using AntConc as 'stepping stone software' to WMatrix

Since many of the students are new to text software analysis, I take steps to ensure that they are not overwhelmed by the functionality of WMatrix. After the first orientation session, two weeks are spent in hands-on teaching of the principles and functions of text analysis software (word frequencies, collocation, concordance lines, n-grams, lemmas, stoplist) *using a much simpler* software - AntConc (Anthony, 2019).²⁷ By simpler I mean that it has both standard functions used in text analysis software and a straightforward interface. I have found that this teaching of AntConc provides an effective stepping stone for students to then move to WMatrix with its more complex (key) semantic domain analysis function and 'busier' interface.

AntConc is not just used as stepping stone software. While WMatrix displays concordance lines²⁸, currently it does not alphabetically sort collocates²⁹ to the left or right of the 'node word', i.e., the word being focused on. In contrast, AntConc can not only sort collocates of a node word alphabetically, it can also highlight collocates in different colors at different positions left or right of the node word, thus rendering collocate patterns over varied spans of words easy to see. Given these advantages over WMatrix for collocation revelation and display, students are encouraged to use AntConc in their analysis and presentation of concordances in their project; the concordance in Fig 11 is produced using AntConc.

9.3 Pilot studies for the assignment project

9.3.1 *Ethos of experimentation*

To remind the reader, "Critical Posthumanism, Digital Data" is a 10 week module. As part of the week 7 and 8 sessions, students brainstorm ideas for potential project foci in relation to *current* campaigns, augmenting thus the meaningfulness of their project as well as the motivation to conduct it. After week 8, students experiment with a range of pilot studies for different possible project foci. Experimenting with different possibilities, which is indeed part of a critical posthumanist ethos (see Section 3.2), is essential for an effective project. Without conducting pilot studies, it is difficult to know with certainty whether students can obtain adequate internet data for a project focus. Furthermore, the more experimenting with ideas for their project focus, and thus the more pilot studies that students generate, the better their prospects for resulting in a novel project focus with real data mileage. That is to say, in eventually eliminating as many ideas as possible which do not work (so well), students stand a better chance of being left with a significant status quo text and compellingly extensive, rich and varied campaign datasets.

²⁷ <http://www.laurenceanthony.net/software/antconc/>

²⁸ 'Concordance lines' show the co-texts for the node word in a corpus of texts, allowing the reader to see frequently occurring collocates.

²⁹ 'Collocation' refers to a combination of lexical words which frequently occur together, e.g.: little + baby, small + amount. Each word in a collocation is said to be a 'collocate' of the other(s).

9.3.2 Flipped pedagogy

For the two weeks of the module devoted to getting students to conduct pilot studies (weeks 9 and 10), I employ a ‘flipped pedagogy’ (e.g. Yusuf and Nur, 2019). That is to say, the standard pedagogical direction of students reacting to the teacher’s directives and seminar content s/he has designed is flipped. This is because, after week 8, it is *the students* who are responsible for creating content for the week 9 and 10 seminars to which both myself and their peers respond.

Students arrive at the week 9 seminar with pilot data compilations and findings for possible projects. They present informally their data and initial findings from their software analyses. Together we discuss ways of improving the studies, suggesting possible interesting data journeys to embark on or alternative ideas. To be clear, these are only stimulating pointers for the students since it is they who ultimately decide on the project’s content. The week 9 session is useful then for students to appreciate, from experiencing their peers’ informal presentations, an array of possibilities for data compilation from the web, with these galvanizing assemblages of data, software analysis, presentation and group discussion potentially propelling fresh rhizomatic movements for students’ project ideas. After the week 9 session, and in advance of the week 10 session (the final week of the module), students have had a week to continue experimenting, to rethink, to elaborate on existing pilot studies, to create fresh pilot studies or to reject initial avenues of research.

Within the week 10 session, students continue their pilot study experiments. I dedicate time to each student in turn, in front of a computer, to assess the feasibility of their ideas, ‘green lighting’ the most promising once it is obvious that further compilation of appropriate web-data will prove to be fruitful. A key advantage of this flipped pedagogy in the final weeks of the module is that students receive guidance on conducting a miniature quasi-project, building their confidence to conduct their project proper after the module has finished. Moreover, in expecting students to do researches in advance of weeks 9 and 10, I can ensure that they generate and experiment with *multiple* potential project foci which, in turn, enhance their prospects of producing a novel project. Finally, when conducting their assignment, they also have the further support and guidance of a written project guide which I provide.

10. Conclusion

10.1 A posthumanist digitally-driven pedagogy

I have highlighted and modelled a critical posthumanist pedagogy which is digitally-driven. The pedagogy is posthuman since it involves i) experimenting with emergent subjectivities distributed across human and machine; ii) pursuing intra-actions that emerge dynamically and fluidly between statistically significant data generated by software, the human analyst and status quo text(s) under critical focus. It is an ethical pedagogy because it involves opening out to unfamiliar campaigns seeking the elimination of the suffering and marginalisation of relatively powerless Others, empathising with and adopting this subjectivity for the duration, at least, of the analysis. That is to say, the posthuman subjectivity that the students adopt is an *ethical* subjectivity.

Crucially, the more unfamiliar the campaign and the bigger the corpus/greater the number of texts in the corpus, the more likely the student experiences surprise in critically appreciating significant absences from the status quo text(s) which the campaign opposes. In turn, the more likely that the student is to decenter habitual consciousness. Moreover, since creation of the posthuman subjectivity is dependent on a developing assemblage, use of

different text analysis softwares, together with different software functions, could lead to qualitatively different posthuman subjectivities based on the same corpus.

10.2 Qualitative analysis of text is driven by quantitative data

This pedagogy is not a ‘mixed-method’ approach where quantitative method and qualitative method, through their combination, offset each other’s perceived weaknesses, that is to say where quantitative method assists qualitative study. Rather recurrent key semantic domains in the minoritarian corpus *data-direct* the analyst’s qualitative engagement with the status quo text. Put another way, quantities are used intra-actively to direct the analyst to new qualitative connections with the text in their probing for potential deconstruction. The data becomes its own ‘small agency’ in effect. And since this text probing is not decided beforehand, it is in effect rhizomatic.

10.3 Benefits

10.3.1 Methodological

A key methodological advantage of this approach is that what the analyst decides to examine in the status quo text(s) is not *arbitrary*. This is because, by definition, a key semantic domain is statistically significant; the analyst has thus a quantitative rationale for using key semantic domains in their critical analysis. In turn, rigour is afforded in what the analyst chooses to (qualitatively) critically probe in the status quo text(s) because the student is data-directed by statistically frequent quantities. All text interpretation is subjective. But as the student’s starting points for qualitative exploration of the dataset are non-arbitrary, the likelihood is augmented that the subjective prosecution of the deconstructive analysis is acceptable to others. That is to say, chances have increased that the analysis will have inter-subjective validity.

10.3.2 Pedagogical

And when the rhizomatic journey is over? After divesting themselves of their posthuman (*ethical*) subjectivity, the student should now assert human independence and make critical decisions about where *they* stand vis-à-vis the campaign. Through their direct engagement with a new Other via this sustained digitally-driven process, the student may end up choosing a new *political* subjectivity of action, being convinced of the campaign’s rationale. This action could be as quick as their circulation of the campaign on social media etc or perhaps, at a more involved level, playing an active role in it. Or the student may do the opposite and decide that they no longer wish to show digital hospitality to the Other, rejecting completely the campaign’s stance and goals. Or they may do something in between – accepting some positions from the campaign but not all. Whatever their decision, because the pedagogy promotes the creation of positive difference from previous Self, horizons are extended; a new vantage has been created by the student for thinking with, facilitating critical perspective on their habitual attitudes. This can enable escape of their routine critical Self, potential exiting of echo chambers, bursting of filter bubbles and, where applicable, disruption of habitual humanism where this may have deleterious consequences. Or, this new vantage can help foster a sharper and deeper appreciation of their own political outlook. Positive things. All in all, the ethos of the pedagogy is the construction and employment of temporary *posthuman* subjectivities, based on corroborated evidence, for the purposes of expanding *human* horizons and enhancing *human* independent and critical thinking.

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Appendix

In Tables 6, 7 and 8 below, ‘O1’ refers to the number of words under a particular semantic domain in the AmE06 reference corpus; ‘O2’ refers to the number of words in the study corpus or text under a particular semantic domain; ‘%O1’ and ‘%O2’ refer to the respective percentages of these amounts. The key semantic domains employed in the analysis are highlighted.

O1	%O1	O2	%O2	LL	%DIFF	Semantic Domain
89	0.26	171	0.02	280.10	1383.43	Smoking and non-medical drugs
1359	4.01	3023	0.31	3980.70	1181.31	Living creatures: animals, birds, etc.
350	1.03	932	0.10	930.30	970.35	Substances and materials generally
371	1.09	1611	0.17	711.27	556.37	Science and technology in general
452	1.33	2016	0.21	848.42	539.03	Medicines and medical treatment
367	1.08	1737	0.18	656.35	502.20	Using
995	2.93	5023	0.52	1684.36	464.59	Education in general
67	0.20	351	0.04	109.76	444.05	Health and disease
49	0.14	308	0.03	67.35	353.44	Safe
80	0.24	537	0.06	102.55	324.61	Danger
341	1.01	2472	0.26	400.70	293.17	Disease
370	1.09	2783	0.29	416.13	278.93	Investigate, examine, test, search
29	0.09	221	0.02	32.10	274.01	Not allowed
40	0.12	320	0.03	41.67	256.27	Knowledge
119	0.35	954	0.10	123.63	255.53	Sad
42	0.12	340	0.04	43.09	252.08	Suitable
307	0.91	2524	0.26	308.67	246.67	Mental object: Means, method
78	0.23	701	0.07	69.40	217.14	Cleaning and personal care
19	0.06	174	0.02	16.45	211.23	Life and living things
44	0.13	479	0.05	28.84	161.81	Green issues
119	0.35	1416	0.15	66.03	139.53	Dead
111	0.33	1329	0.14	60.83	138.05	Allowed
44	0.13	540	0.06	22.93	132.24	Evaluation: Good/bad
24	0.07	295	0.03	12.47	131.88	No obligation or necessity
330	0.97	4225	0.44	157.21	122.62	People
39	0.11	511	0.05	17.65	117.53	Industry
125	0.37	1642	0.17	56.24	116.97	Money and pay
95	0.28	1259	0.13	41.88	115.06	Damaging and destroying
126	0.37	1718	0.18	51.96	109.04	Inclusion
278	0.82	3904	0.40	106.64	102.96	Helping
1847	5.45	26205	2.71	690.33	100.89	Unmatched
106	0.31	1610	0.17	32.95	87.65	Information technology and computing
31	0.09	474	0.05	9.45	86.40	Measurement: General
282	0.83	4435	0.46	79.11	81.23	Change
54	0.16	860	0.09	14.57	78.96	No constraint
337	0.99	5374	0.56	90.58	78.73	Cause&Effect/Connection
212	0.63	3395	0.35	56.23	77.98	Quantities: many/much
44	0.13	708	0.07	11.50	77.13	The Media
540	1.59	8864	0.92	132.25	73.63	Anatomy and physiology
54	0.16	907	0.09	12.24	69.69	Alive
97	0.29	1666	0.17	20.31	65.95	Frequent
60	0.18	1119	0.12	9.05	52.82	Degree: Non-specific
149	0.44	2784	0.29	22.28	52.54	Business: Selling
124	0.37	2319	0.24	18.47	52.40	Violent/Angry
59	0.17	1106	0.11	8.70	52.04	Hindering
178	0.52	3411	0.35	23.72	48.73	Giving
579	1.71	12234	1.27	45.29	34.89	Numbers
102	0.30	2170	0.22	7.64	33.97	Comparing: Usual
226	0.67	4859	0.50	15.78	32.57	Wanted
235	0.69	5158	0.53	14.18	29.85	Quantities
228	0.67	5092	0.53	12.06	27.62	Comparing: Different
297	0.88	6794	0.70	12.88	24.60	Objects generally

Table 6: Numerical data representation of Fig. 5. (PETA Corpus)

O1	%O1	O2	%O2	LL	%DIFF	Semantic Domain
11	4.42	2016	0.21	46.15	2018.13	Medicines and medical treatment
10	4.02	2783	0.29	34.11	1294.88	Investigate, examine, test, search
3	1.20	932	0.10	9.62	1149.56	Substances and materials generally
5	2.01	1737	0.18	15.02	1017.43	Using
4	1.61	1611	0.17	10.95	863.86	Science and technology in general
3	1.20	1259	0.13	7.99	825.01	Damaging and destroying
6	2.41	3023	0.31	14.05	670.49	Living creatures: animals, birds, etc.
12	4.82	6794	0.70	25.69	585.66	Objects generally
17	6.83	26205	2.71	10.90	151.84	Unmatched

Table 7: Numerical data representation of Fig. 6. (FDA Short text)

O1	%O1	O2	%O2	LL	%DIFF	Semantic Domain
1	0.01	1	0.00	7.01	13027.92	Non-commercial
42	0.57	221	0.02	182.69	2394.90	Exclusion
6	0.08	35	0.00	25.01	2150.50	Participating
49	0.67	320	0.03	194.53	1910.21	Knowledge
308	4.18	5023	0.52	731.15	704.98	Education in general
20	0.27	340	0.04	46.07	672.23	Suitable
31	0.42	540	0.06	70.14	653.64	Evaluation: Good/bad
64	0.87	1122	0.12	144.12	648.83	Part
85	1.15	1611	0.17	180.34	592.66	Science and technology in general
10	0.14	199	0.02	20.41	559.69	Useful
51	0.69	1020	0.11	103.67	556.40	The Media: Newspapers etc.
162	2.20	3496	0.36	309.12	508.33	Time: Future
88	1.20	2240	0.23	144.64	415.74	Architecture, houses and buildings
49	0.67	1329	0.14	75.67	384.02	Allowed
153	2.08	4353	0.45	224.99	361.42	Paper documents and writing
12	0.16	343	0.04	17.56	359.29	Evaluation: Unauthentic
81	1.10	2524	0.26	107.95	321.30	Mental object: Means, method
63	0.86	2016	0.21	81.46	310.25	Medicines and medical treatment
15	0.20	518	0.05	17.72	280.15	Evaluation: Accurate
28	0.38	1064	0.11	29.27	245.47	Time: Momentary
11	0.15	425	0.04	11.24	239.78	Frequency
24	0.33	932	0.10	24.36	238.06	Substances and materials generally
72	0.98	2926	0.30	68.60	223.04	Food
66	0.90	2783	0.29	59.60	211.33	Investigate, examine, test, search
15	0.20	641	0.07	13.28	207.21	Evaluation: Authentic
116	1.58	5064	0.52	99.41	200.72	Entire; maximum
74	1.01	3411	0.35	58.20	184.80	Giving
36	0.49	1737	0.18	26.23	172.08	Using
12	0.16	602	0.06	8.17	161.69	No power
126	1.71	6369	0.66	84.61	159.71	In power
33	0.45	1718	0.18	20.99	152.17	Inclusion
188	2.55	12234	1.27	73.53	101.74	Numbers
171	2.32	11651	1.21	59.22	92.68	General actions /making
43	0.58	3023	0.31	13.63	86.74	Living creatures: animals, birds, etc.
23	0.31	1639	0.17	7.01	84.22	Detailed
48	0.65	3555	0.37	12.99	77.25	Law and order
111	1.51	8706	0.90	24.76	67.38	Getting and possession
62	0.84	5374	0.56	9.27	51.46	Cause&Effect/Connection
114	1.55	10652	1.10	11.71	40.50	Speech acts
2715	36.87	296183	30.64	86.85	20.34	Grammatical bin

Table 8: Numerical data representation of Fig. 7. (FDA Long text)