Cyborg Figurations: Exploring the Intersections of Technology, Embodiment, Identity, and Ecology

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Abstract
This cross-disciplinary exploration delves into the multifaceted intersections of technology, embodiment, identity, and ecology through the lens of cyborg knowing. The first contribution focuses on the vulnerabilities faced by individuals with implantable cardiac defibrillators (ICDs), emphasizing the crucial need for acclimatization strategies and agency in navigating their cybernetic embodiment as "everyday cyborg". The second contribution critically examines cultural technologies revealing their role in perpetuating biases and advocates for interdisciplinary approaches, drawing on feminist STS and cyborg theory, to adaptively reshape societal constructs. Lastly, the third contribution envisions a comprehensive theory of cyberzoa that extends the cyborg figuration to encompass nonhuman animals, fostering a post-anthropocentric perspective and an ecologically attuned examination of power relations, exploitation, and symmetrical relationships. By engaging with the concept of the cyborg, these contributions shed light on the complex dynamics and transformative potentials inherent in the realm of technology for both human and nonhuman lives.

Keywords
everyday cyborgs; techno-organic hybridity; cyberzoa; embodiment; ecology.

Implantable Cardiac Devices and the Vulnerabilities of Everyday Cyborgs

Gill Haddow

1. Introduction

In popular film and media, especially in the genres of horror or science-fiction (SF) the image of the "cyborg" has come to be synonymous with the inhuman; monsters created to terrify the viewer due to their superhuman abilities but less than human emotions and feelings. I argue however that the term cyborg needs to be reclaimed from these popular stereotypes. I advocate for increas-

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ing recognition to be given to the existence of "everyday cyborgs" in society as well as recognition given to the vulnerabilities that accompany their creation (see Oudshoorn 2015; Haddow 2021).

Everyday cyborgs are a specific example of techno-organic hybridity created through the process of medical cyborgisation. Implantable Cardiac Defibrillators (ICDs) are implanted medical devices which sense an abnormally fast heart rate that could progress to a sudden cardiac arrest (SCA). The ICD reacts by setting off a series of small electrical shocks termed "cardioversion" attempting to stop the fast heart rate. The ICD then re-senses and evaluates whether a larger shock is required to "defibrillate" the heart to stop the life-threatening rhythm. These events are communicated to health professionals either remotely from the device itself or through investigation by the clinicians in hospital. Due to these capabilities I argue that ICDs are cybernetic devices and when placed within an organism, the "everyday cyborg" is created.

In order to understand the everyday cyborg life, twenty-one face-to-face interviews with everyday ICD cyborgs and thirteen of their significant others were conducted. Findings demonstrated that there were two ways in which new vulnerabilities can occur: 1) living with techno-organic hybridity and 2) seeking control over a cybernetic technology that can be seen and felt but cannot be reached or removed.

The first vulnerability results from the surgical insertion of the ICD and the "invasion" of the medical device into the body. The ICD is implanted generally on the left-hand side of the chest and the outline of the device can be seen on the body. This can result in a heightened awareness for the everyday cyborg of their body which has been now modified into a techno-organic hybrid of human and technology. Usually, the experience of the body is one characterised by a general lack of awareness and absence. Implanting a medical device such as an ICD turns this original "absence" into a presence or as Drew Leder refers to it as a "dys-appearance" whereby the body's original absence becomes absent (Leder 1991). Yet over time, along with the everyday cyborg's acceptance and acknowledgement that the ICD is a form of protection and a "part of them" rather than a threat, the ICD transforms into a corporeal structure of the body, as well as into the background of life facilitating a return to "absence" once more.

Relatedly, the second vulnerability stems from the activity of the ICD should it emit a shock. The ICD is a cybernetic device that can prevent a SCA by emitting a series of increasingly powerful electrical shocks. Its activity is autonomous and out of the control of the everyday cyborg. In interviews with everyday cyborgs they narrated the strategies (such as excesses of activity) that can show that the everyday cyborg caused the ICD's activity. In doing so, they position themselves as the orchestrator of the ICD's activity as opposed to a passive recipient of it. Such strategies enable the everyday cyborg to accept the ICD as part of their body when implanted and if the ICD activates it then allows them to believe they are the ones in control.

This leads to the conclusion that the vulnerabilities created by medical cyborgisation processes are eventually (and repeatedly) overcome through strategies of acclimatisation.

2. Different Cyborg Representations

There is a rise in the number of modern medical implants that are "smart", i.e., devices that are sensitive, responsive and autonomous in their functionality when compared to the

static and stationary hip or knee joints, artificial skin and implanted corneas (Haddow, Harmon et al. 2016). ICDs are one of these increasingly "smart" implanted medical technologies and as mentioned they have features of an autonomous feedback mechanism operating as a closed loop system. ICDs can be considered a prime example of medical implanted cybernetic circuits as homeostatic systems because they are a reinforcement system based on circular causation processes. Indeed, ICDs are playing an accepted and increasingly "normalised role" in peoples' lives and are becoming mundane, ubiquitous and everyday (Harmon et al. 2015; Haddow et al. 2016). The relatively common medical practice of inserting ICDs into the human heart creates an "ICD cyborg" or an "everyday cyborg" (Oudshoorn 2015; Haddow 2021). The "everyday" of the "everyday cyborg" highlights that the "mundane" and "hidden" is important for discussions about their creation, not least, because the implants are literally hidden inside the body, but because much of what is discussed about cyborgs does not focus on their existence and what a routine day is like for some, with even fewer reviewing the "technological mediatedness of human subjectivity" (Schraube 2009). "Everyday cyborgs" as the "new normal" of living a modified cyborg life, is an achievement that cannot be taken-for-granted and requires strategies of acclimatisation and therefore there is huge value in reclaiming the term for this purpose (Das 2010).

However, the genesis of the original cyborg was of a future space traveller and not of an earth dweller. Clynes and Kline in their original definition of a cybernetic organism (Clynes and Kline 1960) offer the original definition of the cyborg, of the cybernetic organism, as human beings whose bodies were modified not so they can continue to live on earth, but so that human beings with body modifications could one day travel in space. These future techno-organic human hybrids were the cyborg astronauts of the future. "For the exogenously extended organizational complex functioning as an integrated homeostatic system unconsciously, we propose the term 'Cyborg'" (Clynes and Kline 1960, 27). Despite the origins of the term cyborg and the everydayness of cybernetic implantable medical technologies such as ICDs, in the public imagination the term is most commonly associated with images presented in popular horror and science-fiction (SF) films. The T-800 android in the first *The Terminator* franchise (1984, dir.: James Cameron) and the Alex Murphy cyborg in José Padilha's (1987/2014) *Robocop*, typify such representations of male gendered, uber-violent, overtly masculinised and devoid of recognisable human emotions. These well-known cyborg and android monsters generally have the physical attributes of strength and power and overt musculature co-existent with the dominant Western idea of masculinity (Connell 1995).

The last version of the cyborg and one that is more well known in academic discussions, is the version of the "cyborg" used by Donna Haraway (1991), simply defined here as a blended identity to challenge the construction of dualisms, such as sex and gender, or human and machine urging that the "cybernetic organism, a hybrid of machine and organism, [was] a creature of social reality as well as a creature of fiction" (1991, 119). She argues that C3I (command-control-communication-intelligence) is the essential code for modern war (1991, 150) of which C3I can be interpreted as a cybernetic system previously outlined by Clynes and Kline (1960). Of particular importance is making evident the vulnerabilities that the experience of cyborgisation brings however. I therefore turn to what becoming and being a cyborg entails as a human experience.

3. Cyborg Voices

Research reports that there is enhanced life function and improved quality of life from being implanted with an ICD, yet there is also research that suggests living the techno-organic hybrid life of an everyday cyborg can have detrimental effects on some recipients.

All cardiac patients may develop some illness identity dislocations as they suffer from having heart disease, condition or arrest as well as from a possible near-death experience (Charmaz 1987). Indeed, psychological studies conducted with ICD patients repeatedly document the prevalence of anxiety, depression and even anger in the ICD population (Sakensa 1994; Duru et al. 2001; Pedersen et al. 2008; Yuhas et al. 2012; Vriesendorp et al. 2013). This data cannot describe whether these emotions are a result of the implantation of the ICD, the activation of ICD and discharging a shock or were pre-existing tendencies relating to the nature of the heart condition. Studies have repeatedly shown that anxiety is heightened in patients whose ICDs have fired to prevent a heart arrhythmia, compared to those who have not experienced shocks (Hegel 1997; Dougherty 1995). The shock that the ICD emits is shocking both in terms of the pain that it causes as well as the unexpectedness of its occurrence. Nelly Oudshoorn suggests that "[H]aving a machine inside your body without knowing when or where it may jolt you induces feelings of disbelief and anxiety" leading her to discuss the new vulnerabilities that ICDs cause (2016, 8). She goes on to highlight how cyborgisation leads to new types of vulnerability "as an internal rather than an external threat and as harm you may try to anticipate but can never escape" (Oudshoorn 2016, 267). Indeed, scholars in Science and Technology Studies (STS) and Body Studies draw attention to the importance of the experiential basis of cyborgisation showing how the "cyborg" condition is created and exists as an empirical entity (Bjorn and Markussen 2013; Oudshoorn 2015). Hence, in order to further understand what is different in the everyday cyborg life when compared to the experience of cardiac associated illness, as well as the strategies of acclimatisation used to becoming and being an everyday cyborg twenty-one face-to-face interviews with everyday ICD cyborgs and thirteen of their significant others were conducted. With National Health Service (NHS) ethical approvals, participants were recruited using NHS gatekeepers and a consent-to-consent approach. Pseudonyms are used in the following accounts.

3.1 Living with techno-organic hybridity

For the ICD everyday cyborg, the cyborgisation process begins from the moment when the ICD is surgically implanted. The ICD is not implanted in the body to the same depth as a transplanted organ might be. In fact, it bulges slightly on the left hand side of the upper chest causing a reverse silhouette. This is the spot where the everyday cyborg was created as a new techno-organic hybrid and its presence can be felt even when it is inert. Stella suggested:

> I can feel it [ICD], sometimes, if I'm lying down, it'll jut out a bit more and I'll go... (making movement to push it back).

Alfred commented that:

Well, I'm really quite thankful… But, it is a bit of an inconvenience, because it does stick up and, you know, you can, when you're sleeping, it's kind of interferes if you're on one side.

The scar and the skin silhouette, serves as a reminder of the everyday cyborg's mortality, albeit one not resulting from SCA. John describes it as:

John: And it's almost like… and I don't want, I don't want to be… it's a bit like being continually reminded that you've got this condition. I mean, in some respects I would rather just blend into society and just become an ordinary person again, you know.
Gill: Do you not think you're an ordinary person?
John: Well, I feel I'm… to some extent I feel extraordinary because I feel…
Gill: Extraordinary [laughing].
John: … I'm being kept… I'm being kept alive by that [ICD], you know.

The everyday cyborg gains a new identity as an "extraordinary" person. Others had less euphoric experiences along with a more ambivalent relationship with the ICD. A few participants said that the silhouette troubled them and Timothy disclosed to having never really got used to having the ICD in his body. He related how "your body shouldn't have a square lump like that…".

The integrity of the body has changed, and the alteration in bodily image and appearance is now a new source of heightened attention for the everyday cyborg. The body is now at the forefront of attention and reflection and in this way, the body is present, alienable and divisible. Indeed, in moments of stress or pain, the absence of our body ceases and the absence itself now becomes absent. For Drew Leder, this is what he calls a primary absence as the body's absence in everyday life becomes very much a focal point; a "corporeal self-consciousness" (Leder 1990, 98). Cyborgisation makes the body's first and primary absence that is a feature of routine living, absent or in Leder's terms a "dys-appearance" (1990).

When our "everyday absence" becomes absent then this is termed a "second order" absence that Leder calls a "dys-appearance" (Leder 1990, 91). It might be simpler to conceptualise the body as now having a presence, however, using Leder's term "dys-appearance" of "absent absence" highlights that the body is usually absent in the first instance. As a concept, dys-appearance necessarily contains within it therefore the importance of the body being a primary absence.

Gradually, the device over time settles and sinks further into the chest as it becomes coated with organic biomaterial. It becomes enmeshed into the viscera and Neil drew an interesting analogy with this process and that of a ship:

Neil: … was that when the device first goes in, it's, kind of like, a, kind of… it's more of a foreign body, if you like, to your… your system… and then once it had been in a long time, it, kind of… the wires and everything else that's there, kind of, get covered in all the, sort of, gunk that goes round your body and it becomes less and less of a, kind of, foreign body over time, because it… you know… you know, I suppose like a ship in the sea, it gets covered… you know, like…
Gill: Barnacles?
Neil: … it gets covered in barnacles and all these type things…

Neil offers the ICD's physical transformation as it gradually becomes coated in the "gunk" of the organic body in the process becoming less "foreign". This progression to a corporeal structure is accompanied with a separate but related process of acceptance as part of the everyday cyborg's identity:

> **Maggie**: There's... yeah, 'cause as in, basically, if I was to try... if you think about it in the opposite sense, if something happens to my body, the wires... you know, the wires do something. And it is, it's part. So, of course, maybe in, like, fifteen years or ten years' time, I will actually feel, you know, this is... it is *part of me*. And I suppose, in a way, maybe, you know, you might accept that it's... it's strange to think of accepting a piece of machinery that, sort of, is... (emphasis added).

Growing comfortable to a hybrid techno-organic status and living with an ICD depends on the everyday cyborg experiencing the ICD as "part of them" and also as a "benefit". Stewart reported that his ICD was, "You know. It's like my shoes. You know, I don't consider my shoes alien. I don't, I mean it's, obviously I wasn't born with it, but it lets me be who I am". The ICD is part of the body's image and integrity and has also become "part of" the everyday cyborg's identity. Stella had received a specialised ICD called a CRT-D to treat her heart failure and is a device that is implanted with an additional wire to go round the back of the heart to co-ordinate a more efficient heartbeat. She told me that she "instantly felt the benefit from it if I didn't have it [ICD], I wouldn't be able to breathe, you know". She readily suggested, "it's just *part of me* now, it's no big deal" (emphasis added).

"Part of me" along with the enmeshment of the device are processes that are part of a more general acclimatisation progression. With the ICD gradually becoming bodily enmeshed and accepted as a benefit it is also no longer seen as a threat. Indeed, Lucie Dalbert's research findings suggest there is an acclimatisation or incorporation process necessary to adjust to living with a deep brain stimulator (2015). This is based on the individual's acceptance of the technology as being a positive development and "part of them" (Dalibert 2015).

Those around the everyday cyborg can also view the ICD as a benefit because it removes some of their responsibilities of vigilance and over-sight they may have had before the cyborgisation process and over the everyday cyborg:

> **Stewart's wife**: ... when he [husband Stewart] was very ill I was concerned because you'd go to bed at night, this was before he had his ICD put in, we'd go to bed at night and I'm listening to his breathing because sometimes... it sounded as though he was going to stop. And then I thought, "oh God, something's going on" and then he would breathe again. So, I really was, he was totally unaware of that because he was asleep... So that I was very keen for him to have an ICD because I thought, well at least if I'm asleep and he stops breathing or whatever then something's going to happen to, to save him.

The ICD can protect the everyday cyborg from a SCA, allowing family and friends to step back from such oversight.

3.2 Seeking control over a cybernetic technology

The second vulnerability stems from the capacity of the ICD to deliver a series of increasing powerful electric shocks in order to prevent a sudden cardiac arrest (SCA) in those thought at risk from having one, or who might have already experienced one but in the process potentially physically compromising the everyday cyborg.

If the ICD performs its life saving function and discharges shocks, the event is explained retrospectively by most everyday cyborgs locating their actions as the reason for the discharge. Strategies used such as blaming themselves through emphasising excesses on their part or indeed the device misfiring (for example, if the parameters for shocks are set too low; the leads have broken; or the ICD has mis-sensed). Steven's ICD discharged a shock which he explained as: "Well... it went off once, but that was my own fault... I was trying to lift something awfully heavy". Timothy explained the shock he received from his ICD was due to his tendency to worry:

> **Timothy**: I've said about I'm a worrier, so maybe that has got something to do with it... Even now, that last time, beginning of last year, that was when I had one or two incidents... there was worry then, there was a bit of panic then even when the incident happened, shaking and a right, they [clinicians] said a kind of panic attack, as well as something happening and that didn't help it any.

The process of acclimatisation in this regard amounts to the everyday cyborg offering explanations for the ICD's emission by placing themselves as an agent of the activity rather than the recipient. Even being a "worrier" asserts some control over the device rather than acknowledging that they are in control of the device. As Jackson says such strategies make us, "authors of meaning rather than victims of circumstance" (Jackson 2002). Informal discussions with cardiologists suggest that within reason, there is little or no relationship between what could be termed the ordinary activity of the everyday cyborg and the ICD discharging shocks.

4. Discussion: Becoming and Being Cyborg

Becoming a cyborg in the everyday means that for some individuals there is collateral damage; vulnerabilities created, skin cut and changed, body integrity breached; viscera compromised, relationships reformed, subjectivities altered. The construction of identity is a process, for example, that is often disrupted by illness (Charmaz 1987) but also more recently by technoscience innovations such as cyborgisation (Sulik 2011). The everyday cyborg becomes at times more vulnerable in a new techno-organic hybrid configuration. Cyborgisation, alters materiality and affects subjectivity creating a need for individuals to undertake the successful acclimatisation process involved in becoming and being cyborg. This occurs in the cyborgisation process when embodiment as a techno-organic hybrid is created at implantation and further affected by possible activation. In these moments the body is no longer experienced as an absence and comes to occupy the forefront of the everyday cyborg's attention.

Significantly, how human beings are embodied, that is the relationship between identity

and body (whether a person is a body or has a body) also is dynamic with a dys-appearance caused by early cyborgisation becoming co-existent with having a body as a separate alienable entity. Acclimatisation, however, may bring a more settled and integrative embodiment experience with the everyday cyborg becoming more likely to return to the holistic view of embodiment and the ICD as becoming part of them. Then having or being a body is not a static state, but a fluid experience of embodiment that is often ambiguous. I suggest that the ambiguity is not just in terms of whether I am or I have a body, but its fluidity is based on events that bring about questions of when I am or I have a body. This stems from the braided processes of the implantation of the ICD that can create challenging alterations in embodiment and living with the ICD activation means reinserting narratives of control.

Being an everyday cyborg is a fluid experience of "dys-appearance" – of being aware and focused on embodiment as a techno-organic hybrid after implantation and post activation, and then of this status becoming an absence – as the everyday cyborg acclimatises returning to their living life with a heart device (Leder 1990; Sobchack 2010). The intimacy between technology and organism in the everyday cyborg's body has a unique rehumanising effect; one that makes them possibly ever more vulnerable. The ICD has a bodily intimacy that then creates a paradox: it is inside the body and almost inseparable to it whilst simultaneously being the furthest away and out of the control of the everyday cyborg. For the everyday cyborgs, it is the paradox of intimacy that is created as the cybernetic device within the body also creates distance (as it cannot be reached by them) and a lack of control (as its functioning cannot be altered by the everyday cyborg either). Then re-appropriating the term cyborg for our everyday application reinserts issues about what cyborgs actually need to live happy and fulfilling lives; what kind of support they and their significant others might find useful as well as what type of information and understanding is required to acclimatise to a new techno-organic hybridity. If there is a need to understand and empower those with varying abilities such as everyday cyborgs, then there may also be a moral and political requirement to recognise and even celebrate the hybridity of the materially diverse individual.

The increasing reliance on techno-scientific processes such as implantable cybernetic devices is an example of a much wider process that has been described as "biomedicalization"; a state that is different to but is sprung from medicalisation when medical jurisdiction controls an ever-increasing area of social lives. Biomedicalisation refers to, "the increasingly complex, multisited, multidirectional processes of medicalization that today are being reconstituted through the emergent social forms and practices of a highly and increasingly techno-scientific biomedicine" (Clarke et al. 2003, 162). Inspired by Illich's medical nemesis (Illich 2003), whereby medicalisation is the treatment for the diseases that medicalisation itself creates, so by extension are technological and cybernetic fixes the "biomedical nemesis" of biomedicalisation? Cyborgisation as part of the biomedicalisation process can produce its own unique forms of iatrogenesis because of the vulnerable re-humanisation it creates and the strategies that are demanded consequently.

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Cyborg Troubles: The Promises of Posthumanities

Cecilia Åsberg

1. Introduction

We live in troubling times in need of multiple approaches and versatile research. The climate crisis is no longer a future prospect but unfolding before our very eyes. The most vulnerable peoples, those of racialized and feminized poverty and a long legacy of exploitation in the Global South, are invariably hit the hardest. In addition, we see also a resurgence of white nationalism, right-wing populism, and new ways of warfare. We bear witness to a new world-engaging war in Europe, in Ukraine. We face energy crises and environmental problems, such as oil spills, harmful toxins, gas leaks and warming oceans. The global Covid-19 pandemic recedes with looming threats of *new* multispecies contagions appearing. The troubles of the world respect few boundaries. Amid these nested crises, our news, information, knowledge and social media channels provide angles and perspectives in ways that often reflect back to us our all too narrow preferences and world views. They mirror and exaggerate our own limited sense of self in world full of rampant individualism, even grandiose narcissism (Casale and Banchi 2020). Boundary crossings of all kinds define the present.

In a struggling world, riddled with nested crises and societal challenges, Donna J. Haraway's ground-breaking re-appropriation of the figure of the cyborg from the 1980s remind me that proficient modes of addressing complex worlding problems have been developed be-

fore and remains available to us as forms of cyborg knowing. In what follows, I will try to unravel some of the conceptual threads central to Donna Haraway's notion of the cyborg.

It is a well-known story by now in STS, how the cyborg challenges hierarchical dualisms and oppositions between organism and machine, nature and culture, body and technology, female and male, human and nonhuman, imagination and material reality (Balsamo 1996; Franklin 2006; Åsberg 2007; Åsberg and Lykke 2010; Oudshoorn 2020; 2021). It induced a performative playfulness with serious political issues that rubbed off in scholarship, made waves. Haraway's cyborg heralded the ontological turn of critical posthumanism and (feminist) new materialisms of all kinds. It did so without giving up on, instead harnessing, previous insights from social constructionism, Marxism, anti-colonial feminisms, cultural semiotics, and the humanities. The cyborg signals to me the needed re-invention of the humanities and social sciences so to re-imagine culture, society, and human identity in ecological and technological terms. Various kinds of what we may call *cyborg knowing* flourishes in fact today, under several academic banners and names. It thrives as an attitude of "staying with the trouble" (Haraway 2016a; 2016b), a "double vision" (Haraway 1991) to the ambivalences of the integrative political ecologies and technologies of the now.

Haraway's cyborg stands for a processual "natureculture" ontology, but also for an incentive to boldly re-organize ways of knowing that make us accountable. A case in point in this paper is the feminist posthumanities, relentlessly postdisciplinary research in and beyond STS, that bring art and science to interdisciplinary humanities and more-than-human feminisms to people. My aim here is to trace and revisit cyborg knowing for what onto-epistemological approaches it may have enabled in research, to map out the more-than-human, less academic perhaps, and *more humane* promises of cyborgs today.

2. Enter cyborg

Basically, the cyborg is a great pedagogical starting point for students of history of science and technology, feminist, queer and anti-colonial theory and gender studies, social studies of medicine, media and technocultural research at large. In my years of cross-faculty teaching at a few Scandinavian and north European universities, it has worked surprisingly well also for students of biology, engineering, design, new media, sustainability science and nursing. It invites discussions on ontology, epistemology, (breaks with) Euromodern history and theories of subjectivity and subjectivation, ethics, power and resistance in the "matrix of domination" (Collins 1990).

Especially so if we read Haraway's "A Cyborg Manifesto" (as ontology) alongside "Situated Knowledges" (as epistemology), as we tend to do. Published in 1985 for Socialist Review, the cyborg manifesto grew into a prophetic meditation on how cybernetics and digital technologies changed everything – from how we do gender to how we connect across the globe. A social media influencer in Stockholm today uses a phone assembled in China with rare earth minerals extracted in Congo to access a platform moderated by Filipinas and line pockets in Silicon Valley. New technologies of affiliation, exploitation and solidarity break and re-draw boundaries of all kinds.

Haraway's second most influential essay, on situated knowledge, appeared a few years later and provide an epistemology to the cyborg's ontology. To Haraway, knowledge is always

situated, environed and embodied in a particular geopolitical, historical, instrumental and "natureculture" context. It is limited and purposeful, a way of storying exposure.

Both texts, making up "cyborg knowing" here, appear in Haraway's widely translated 1991 book, *Simians, Cyborg and Women*, with the under-appreciated subtitle *The Re-Invention of Nature*. I read it as indicative of Haraway's attempt at finding common ground across the arts and sciences in a postnatural world. Haraway's writing and conceptual work seems largely forged, as she states, "inside worlds at war" (2004, 2). She was born after World War II, and wrote amidst the Cold War, the Science Wars, the war on terrorism, and the ongoing conservative Culture Wars in the USA.

"These worlds at war are the belly of the monster from which I have tried to write into a more vivid reality a kin group of feminist figures" (ibid.), Haraway writes to contextualise her kennel of cyborg kin concepts. Cyborg knowing may, in such a situation, create common ground for how to deal with how old dreams of a common language built on disciplinary nostalgia, modern categories and ideals of purity.

In a research project on creative AI and the artistic imaginary, we have in my group a subproject on AI image generators, like MidJourney, DALL-E 2 or Stable Diffusion (Jääskeläinen et al. 2022). We look at creative AI in music, dance and image-generation for how it transforms the craft and shift power. Visual AI enable a complete reimagination of the all too humanistic image of gender, race, and human (species) individualism expressed *at the locus of the face* (Barthes 2007).

AI for facial analysis, a technology of recognition, is a common application on most mobile phones. Society enfolds already today on these technologies for securitization and surveillance of borders of all kinds. Face shape, features, skin colour, movements and make-up are captured, analysed, and compared and matched with classifications (in terms of gender, race, scars, geometry and even inferring sexual orientation) against databases (Kosinski and Wang 2018). AI is also generative technology for creating images of faces and individuals (people, but also cats and horses) never to have existed[1]. Even more so as generated AI art, where new imagery is produced by textual prompts. Such creative AI really puts our common technological imaginary and visual culture to the test of stereotypes.

Cyborg knowing enables us to critique this visual culture *as a digital dream of a common language*. These AI image generators (e.g., Figure 1) routinely display systematic intersections of sexist, racial and heteronormative bias by way of design, prompts, and the stock photo of art and imagery already existing for the training of machine learning systems in the vast online world. Unsurprisingly, we get back from the systems the exaggerated and distorted mirror images of humanity that we put into it. To paraphrase Haraway (1991, 154), the cyborg world of global satellite surveillance, google maps, CCTV, facial recognition technology, AI-generated visuals and video (often revenge porn), and algorithmic bias is about "the final imposition of a grid of control on the planet", about territory, war and "the final appropriation of women's bodies".

Figure 1.
Gendering and racializing parameters in *ArtBreeder*,
an example of facing AI art, generated by
Petra Jääskeläinen (KTH).

From another perspective, it is also about embodied and lived social realities in which people are not afraid of neither "their joint kinship with animals and machines", not of their "permanently partial identities and contradictory standpoints" (ibid.). Overtly sexist and racist renditions of our visual culture and self-image shape our sense of self as we reach out an extended arm for a cat-filter selfie to post. In one sense we then also play creatively with stereotypes and expressions of gender, art and species kinship, moulding a *re-engendered* cyborg imaginary.

3. Cyborg knowing is not enough

Cyborg knowing is about assuming there are more things going on than we could ever imagine, about unlearning old categories of thought and inventing new epistemic practices based on modesty, partiality and a generosity of co-existence.

Most importantly, cyborg knowing invokes an ontological feeling of connectivity. A feeling that, "nothing comes without its world", in the words of Haraway (1997) and Maria Puig de La Bellacasa (2012). To some, this is a methodological invitation to embrace an ethics of connectivity. To others, this feeling is one of a daunting vertigo as it requires great responsibility on the part of us as readers, researchers, students and knowledge-brokers. Also, it always assumes our complicity in what we critique.

This cyborg connectivity means that knowing is inconceivable without the multitude of relations that make thinking and knowing possible inside nested crises. It means that knowl-

edge is physically situated, embodied and embedded in locations, instruments, bodies and concepts, as well as in rhetorics and story-telling devices, and, that objective truth always remains partial and limited but good to have, in heaps, for greater sociability. To Haraway, progress in knowledge is not a bad word but the hard and modest, scientific way of life (Haraway 2004, 4; 1997). Knowing is social and imaginative practice, and it co-creates the surrounding world – enables a practice of worlding and re-worlding. As such (as a feminist materialism in the American pragmatist tradition), it borrows from social constructionism (the strong programme), from ANT (the nonhuman) and standpoint theory but refuses representationalism. It makes for what Karen Barad (2003) later described as an onto-epistemology of posthumanist performativity and agential realism. Nothing comes without its relational and co-constitutive world, making political ecologies and technologies of how we are all biochemical matter, and how we all matter, a core concern for research.

A highly teachable principle of research permeates Haraway's opus, from *Primate Visions* (1989) to *Staying with the Trouble* (2016), that stories and matters of fact intermingle and that it is daunting, but possible to trace this worlding analytically as a political implosion of nested words and worlds (Dumit 2014).

The works of Donna J. Haraway plays nicely with STS and feminist theory practices (1994), with interdisciplinary humanities at large, and in this short piece I want to revisit and highlight Haraway's cyborg concept in the light of some contemporary knowledge practices. Not so much for what it was, but *for what it did* and for what kind of postdisciplinary research it enables today (Lykke 2011). Our time is wide open to new conversations and new synergies of cyborg knowing, to the exploration of alternatives for how our scientific communities are ordered (to echo Lucy Suchman), to revisiting and re-tooling analytical toolboxes, and to new configurations of knowledge.

3.1 Exit anthropocene, exit identity

For those of us who has been committed to the intersections of feminist theorizing, cultural studies, environmental justice and science and technology studies in the last decades, Haraway's work, and perhaps in particular her "Manifesto for Cyborgs" have simply been pivotal. To me, "the cyborg" seems a bit like the concept of the Anthropocene now, also a term for the implosion of nature and culture. The notion of the Anthropocene started its present career in geological and climate sciences, coined in 1980 by ecologist Eugene Stormer and gained fame in 2000 when Nobel laureate and Dutch chemist Paul Crutzen picked it up. In that sense, the Anthropocene and the cyborg generated new fields of research. They also generated unwarranted associations, at the risk of losing critical salience as trendy buzzwords. I would like to turn this argument on its elitist head and point to how important reverberant and irreverent concepts can be for collective thinking – from the standpoint that there is no neutral or innocent way of seeing or knowing to begin with. There are only starting points, conceptual portals, to collective learning, unlearning and re-learning.

Initially, the Anthropocene question to stratigraphers concerned whether human development had become a force on the planet to create a geological record, warranting a new name for this all too human era (Zalaciewics et al. 2015). The term soon became heavily politicised as it intermingled with climate change discussions (Steffen et al. 2011; Crist 2013). To some it stimulated activism and provided a starting point for discussions on how to remodel society in

emancipatory directions (Cuomo 2011; Klein 2015). To others it was not specific enough, even misleading, and moving away from crucial concerns about social justice and capitalism's responsibility for environmental changes (Crist 2013; Malm and Hornborg 2014; Moore 2013).

Anthropocene, Capitalocene, Plantationcene, Wasteocene, Gaia, Chthulucene and the Great Acceleration; there are many names for our global instability in academic circulation. This richness in our collective terminology, is like Haraway's "Chthulucene" all made up of "ongoing multispecies stories and practices of becoming-with in times that remain at stake, in precarious times, in which the world is not finished and the sky has not fallen – yet" (Haraway 2016b). To me this openness is the cyborg gift to postdisciplinary research like *Environmental Humanities* (Bird Rose et al. 2012; Neimanis et al. 2015; Åsberg 2018), and a chance to get along together with some grace in our conversations. Like cyborg knowing, the Anthropocene-variations, both risks to become a common language and of creating a new Master narrative. It both ignites collective action, *and* risk spread fatalist despair and the illusion of one single penultimate solution. What today might amass to Anthropocene social sciences, environmental humanities and Anthropocene feminisms (Grusin 2016), take us as scholars away from the romantic notion of finding *one* concept to describe it all. To paraphrase from "Manifesto for Cyborgs", our politics cannot be rooted in (humanistic) *identification* if we are many things simultaneously, *vanguard parties* if we are part of mass-movements, *purity* if we live in a postnatural and impure world, and *mothering* if we do not wish to reproduce oedipal patterns of care as women's business (Haraway 1991, 219).

This giving up on identity, while insisting on the transferability of transformative insight from knowing together on location, is a form of postdisciplinary "rooting and shifting" for the sake of mobilising strategic alliances, to borrow a term from feminist political theorist Nira Yuval Davis (1997). It started out as a concrete practice of "*politica trasversale*" amongst a feminist activist group living in Bologna, Italy in the mid-1990s. They visited war-riven conflict zones to support women in other countries, in a programme they called "Women Visiting Difficult Places" (Cockburn 1998). Like the cyborg concept, this transversal approach frees us from *unproductive* guilt trips, and from the need to root politics in *one* single problem (capitalism, gender, legacies of empire, technological or biological or ecological determinism) and steep it all in a dream of a common language. Concepts that matter to us will do different jobs in different settings for different reasons.

4. Companion species

Cyborg thinking changed a lot of scholarly discourse in the decades after the 1980s. The connective cyborg is a prominent harbinger of the need to boldly work in interdisciplinary collaborative contexts. It brings necessary feminist theory to STS and science to the humanities by way of feminist cultural studies of science and technology. To me, the formative convergences in Lykke and Braidotti (1996), Franklin, Lury and Stacey (2000), Bryld and Lykke (2000), Alaimo (2010; 2016), and Grusin (2017), to reference a few studies, are exemplary and highly educational ways of cyborg knowing. The rich work of Haraway has flourished as practices – also in the neglected margins of the privileged North. In its wake, synergies of ecofeminist ethics and queer cyborg knowing found new ground in eco-cultural studies

(Alaimo 1994) and later, in environmental humanities. Haraway's "posthumanism" transposed from (too bounded) cyborgs to the bio-ecologies of *companion species*.
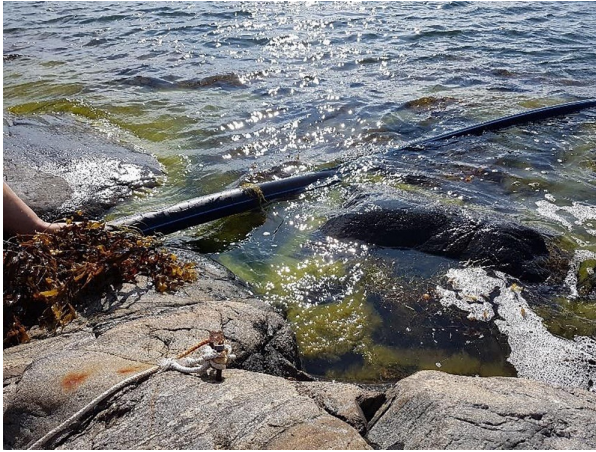

Figure 2.
By Askö Lab in the Baltic Sea, green slick algae,
bladderwrack, a cable and other traces of humans.
Photo Askö island, 2017.

At a fast pace, biodiversity loss, warming ocean waters and climate change bring new kinds of exposure to the cold and far-away northern shores. Our society's dependency on the companion species of sea and coast are hard to fathom, ranging from the oxygen we breath and the carbon sink work of algae (outmatching rainforests) to the food we eat. Algae, like algorithms, are embedded everywhere in daily life, in the beer we drink or the *gelato* we lick. In a project on arts at the edge of the sea, we attend to the companion species of the coast, using and developing marine science, blue humanities and art by the long-stretching Swedish coastlines (e.g., Figure 2). Kelp and bladderwrack, invasive Pacific oysters and salmons, crabs and mussels, provide object-lessons for storying exposure (Åsberg et al. 2020; Åsberg 2020; 2023; Jue and Weeks 2023). Rotting seagrass, waves, ebbs and flows, shells, plastic waste, abandoned fish nets, flip flops, and other junk, even washed-up military waste from previous world wars, like sea mines or dumped canisters of arsenic-laced mustard gas, make for a strange multispecies community by the beach (Neimanis et al. 2017).

The trans-corporeal ethics of companion species at sea:

> turns from the disembodied values and ideals of bounded individuals toward an attention to situated, evolving practices that have far-reaching and often unforeseen consequences for multiple peoples, species, and ecologies. (Alaimo 2008, 253)

It demands cyborg knowing, yet also so much more than critique – it demands the constructive creativity of more-than-cyborg legacies.

Insisting on Adrienne Rich's "politics of location" and Haraway's "situated knowledges", cyborg knowing becomes a portal to understanding all kinds of embodied worldliness and to the development of new modes of storying exposure. To this day, Haraway's cyborg invites critical adventures in exploring the technoscientific globalization of planet Earth, the common languages of algorithms, AI and the Anthropocene. My argument, or rather a suggestion, is here that technoscience studies today need up-dated and *ecologically* situated cyborg knowing for finding common ground and strategic alliances. Yet it will *never work as a universal solution*: cyborg knowing is more like an engine of discovery, putting things in new constellation and new perspective, inviting re-conceptualization. For Haraway, as pointed out by Grebowicz and Merrick (2013, 8), the "cyborg's 'global' is not the philosopher's 'universal'". Instead, cyborg knowing refuses both relativism and totalism by an epistemic embeddedness that takes both science studies and feminist theory far beyond any "standpoint", "identity politics", singular focus on "gender", on "place" or eco-romantic notion of the innocent local.

5. Posthuman in practice

As argued, cyborg knowing thrives in feminist and queer theory practice (cf. Rosi Braidotti, Jack Halberstam), in feminist post-, anti- and decolonial theory practice (cf. Gayatri Spivak, Anna Tsing, Madina Tlostanova), in feminist eco-cultural studies (cf. Stacey Alaimo, Myra Hird, Mette Bryld and Nina Lykke) and in feminist ethics (cf. Maria Puig de La Bellacasa) and of course in the reverse engineering of the humanities that goes on in feminist STS by way of N. Kathrine Hayles, Lucy Suchman and Karen Barad.

I would also like to claim that the socialist-feminist cyborg was a harbinger of the present surge of feminist new materialisms and posthumanisms, but I may be kicking in already open doors in that regard (Braidotti 2013; 2021; Åsberg and Braidotti 2018). Even if Haraway herself denounced the posthuman (in favour of companion species) for the work needed of a more inclusive humanism (Haraway 2006), she invited, what I would like to call the *practices of posthumanities* (Åsberg 2009; 2021). Haraway's cyborg heralded already such more-than-human feminisms, *ecologically, biologically, and technologically situated*. In STS as in Gender Studies, this implies a crucial shift in the feminist modes of attention towards other species, the body and to biology as a scientific discipline of great transformative potential in society. Following recent turns "towards relationality and the enacted nature of entity boundaries" (Stacey and Suchman 2012, 24), even widely termed the posthuman term, the cyborg, I conclude, is an excellent starting point for mapping critical posthumanisms, for what they can do, and how they congeal into epistemic communities and into wider knowledge ecologies to re-invent how we do immersive research in society, as part of society, as part of the world.

The work and life of Donna Haraway, passionately dedicated to both feminism and science, especially biology in theory, has inspired thousands of people both inside and outside academia. She is one of few feminists who have reached very diverse audiences and is cited and sighted at both science and technology studies conferences, in cultural studies surroundings and in gender

studies classrooms. Modern society is entangled in complicated issues of life and healing, death and suffering, of who gets to play and live, who gets to die, and who decides and profits from that. The feminist views to the everyday cyborgs that Haraway proposed was a way of unpacking and holding up for inspection all that. New configurations of knowledge ensue from that.

Cyborg knowing, re-read across most of Haraway's work (and many of her interlocutors, like Bruno Latour, Rosi Braidotti and the rich and layered literatures beyond these stars) and most of all, what it generated in feminist, cultural and STS research communities, I claim, produced an important incentive. It produced the encouragement to respond with *more humane* (if feminist, queer, crip and anti-racist/anti-colonial inclusions can be said to do that) and with a *more-than-human* humanities to the *all too* humanistic impact on ecologies, climate and socio-technical systems.

Today, it has become quite clear to critical thinkers that there is nothing natural or given about how we organize society (Åsberg 2017). That also technology, medicine and science are, to use Bruno Latour's paraphrase, politics by other means. This goes of course for interdisciplinary research in arts, humanities and social sciences too. Following from this there should be nothing natural or given about how we organise our research. In fact, in a world so easily at war there is nothing natural, at all, only the negotiated struggles and prospective alliances with real effects and long-term exposures to peoples, species and environments. For this, I think we need always to rethink how we organise our collective cyborg knowing.

Last in this essay, I want to contend for exactly that kind of reorganisation of lively feminist (critical/creative) research practices and research concepts with impure cyborg roots and routes, between and beyond the disciplines. Research that can help us inhabit the re-invention of nature, and of culture. We need the generative reconfiguration of critical concepts and configurations for situated knowledges. You see, I think we need research that can be *as responsive to change as the world which it purports to critique*.

The cyborg was already for Haraway much more than a metaphor for the joint merging of biology and technology. It collected ideological dreams, fractured identities, borderlands and conflict zones of many kinds, like the bridging of the human species body and other biological organisms, technoscience and society, the virtual and the real (Haraway 1991). It was one possible figuration, an imploded node of fact and fiction, embodied and embedded in the networks of technoscience. An implosion, in contrast to an explosion, concentrates matters. Haraway's cyborg was one such implosion of entangled cultural meaning and materiality with socialist feminist Cold War urgency. She picked out critical threads out of that over-determined, imploded figure (from the contemporary NASA-imaginary) and she re-read the cyborg as a political myth, an ironic parable of processes already embodied and set in motion that not necessarily have to end badly.

The cyborg has potentials still as a reconfiguration of knowledges. A metaphor for modern technoscience, cyborgs points to the collapsing of nature and culture into each other, for sure. Haraway saw the same collapsing of the soft and hard sciences, hard and soft societal powers of subjectivation, making the cyborg a figure of interdisciplinary alliances and non-innocent, temporary identity in a world dividing and connecting in new ways. If Euromodern-type dichotomous thinking about nature and culture, according to Haraway was impossible to uphold in the new world order, then other feminist dichotomies like sex/gender would also be problematized along with the cyborg. The cyborg functioned as a research portal to the

more-than-human ecologies and technologies of contemporary posthumanities.

Over the last decade of academic activism, I have come to term such efforts *feminist posthumanities* (Åsberg 2009b; 2020). Not because we are over the humanities, but because we need it in thicker registers (Lyotard 1991). Such research practices need to move us, motivate us and be move-able across boundaries. In some sense, this entails perhaps the reimagining of feminist technoscience scholarship in more open-ended, less disciplinary, and in more-or less-than-human inventories. To me, feminist practices of posthumanities acts like situated cyborg knowing and prepares the ground for ulterior sets of *minor research ecologies* that may or may not traverse the academic boundaries. After all, the cyborg world respects no academic disciplines – only emergence of whatever may be, and we are, more often than not, surprised of the turns taken. Feminist posthumanities as cyborg knowing defies fatalism and determinisms of all kinds. It is not a practice of DIY, but a DIT – *do it together*.

This type of research practices ventures outside the ivory towers, join hands with activists, artist, science journalists and change-makers of the world. Examples of this collaborative practice are, for instance, the co-op of the UN Ocean Decade's transnational art and outreach project *We Are Ocean* with my research group *The Posthumanities Hub* (see Figure 3), or how art centres (Bonniers, Färgfabriken in Stockholm) or Sweden's Historical Museums are co-funding exhibitions, postdocs and doctoral-employments with the Hub; or how a upper secondary school class in a Stockholm suburb along with youth art activists ("Squid Squad") in rural Gnesta supported with their work and commitment one of our environmental communication projects ("Reclaiming Futures, Storying Change"). These are some recent examples of co-operations and jointly envisioned projects, some successfully funded by research councils, some not. But they all give added value to the cyborg knowing I teach and practice at the virtual, multiversity platform and cyborg lab, *The Posthumanities Hub*.

Figure 3.
Banner of *The Posthumanities Hub*.

Acknowledgements

Notes

[1] See facial image generators, such as: https://this-person-does-not-exist.com/en (see The Research Nest 2020).

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Cyberzoa: Refiguring the Ecology of the Cyborg

Federica Timeto

1. From cyborgs to cyberzoa

This paper sketches out some possible directions for developing a theory of cyberzoa – animal-machine configurations of human and nonhuman animal lives – that prioritize the ecological aspects already present in the feminist cyborg figuration and take into account the more recent debates on the convergence of multispecies ecologies and technologies in the humanities and the social sciences.

This multispecies perspective responds to the call to address the zoological connection (Bryant 1979) in the social sciences and applies it in Technoscience Studies. In technoscience, "human and nonhuman actors [...] are brought into alliance by [...] material, social and semiotic technologies" (Haraway 1997, 50). Even if the feminist cyborg includes nonhuman animals in its definition, and non-feminist cyborg theory relies on animals as models, in both cases, the zoa [Greek: ζώα] in the cyborg seem to have faded into the background. However, cyborgs are "constitutively full of multiscalar, multitemporal, multimaterial critters of both living and nonliving persuasions. Cyborgs matter in terrain worlding" (Haraway 2016, 105), and this worlding is what all zoa make possible.

Zoa means animals in Greek and is currently used to compose many terms referring to the animal kingdom; although the latter obviously also includes human animals, their social life has nevertheless been distinguished – and used to distinguish human beings – from "bare life" in the Western tradition, being thus defined with the term bios as opposed to zoé. Zoa were members of nature as opposed to (because without) culture, therefore also without technology (Agamben 2004; Braidotti 2019). Arguing for a multispecies, deeply ecological redefinition of the cyborg, the use of the term cyberzoa is hereby proposed to refer to animal-machine configurations including, and paying attention to, both human and nonhuman animal lives and their flourishing, following the consideration of a natureculture continuum

(Haraway 2016) that profoundly undermines the exceptionalism/exemptionalism of the human species (Catton and Dunlap 1980).

Cyberzoa require that we consider extended, multispecies technosocial alliances, as well as whom they benefit and why, and that we do not see technosocial agentivity as merely a human property or capability. Apart from in "exceptional" situations (from Koko the gorilla using a computer to primates on social media taking selfies), unfortunately today nonhuman animals become-with machines mostly – if not exclusively – when they become machines since an active, creative, socially empowering encounter with technologies is still a human prerogative. Let us think about "smart" livestock farming, for instance, whose aim is complete control over the animal's "enhanced" body for optimizing production. Given that the cyborg world that Haraway imagines in the first manifesto (Haraway 1991a) is one in which "people are not afraid of their joint kinship with animals and machines" (ibid., 154), can a world be envisioned in which other living actors in cyberzoa live their technosocial relations without being afraid of their joint kinship with human animals and machines? After all, "[t]he animals make demands on the humans and their technologies to precisely the same degree that the humans make demands on the animals" (Haraway 2008, 263).

2. The current debate on the encounter of ecology and technology

The multispecies societies in which we live, including both human and nonhuman actors, are articulated through complex ecosystems in which biology and technology increasingly redefine themselves and each other. Life is not only seen as technological from its inception and evolution but is also technologized in unprecedented ways, from the geolocalized apparatuses and networks set up for animal husbandry, conservation projects, and warfare to biomimicry and biorobotics. The fields of Digital Sociology, New Media theory, and the relatively new field of Animal-Computer Interaction (ACI) are particularly interested in the convergence between the living and the digital. Most often, however, such convergence continues to revolve around the human as the only species benefiting from it. It is only very recently, due to the current environmental crises and the urgency of finding a different way of inhabiting the world, that the need to reframe the relation between ecology and technology has resurfaced, paving the way for an ecological re-turn to the cyborg: this implies a post-anthropocentric re-orientation of both the theoretical interpretation and practical application of this figuration, whose already existing ecological openings have been neglected for too long.

Peters, Jandrić, and Hayes (2021), for example, discuss the "postdigital condition" and advance a critique of technological corporate "solutionism" that embraces the emergence of the biodigital, that is the turn of the biological into the digital and vice versa. Even though the authors understand the biodigital as necessary for the planet in terms of environmental enhancement and renewal, throughout their arguments their objective is sustainability for the human species, which is in keeping with the One Health perspective. Although Peters, Jandrić, and Hayes acknowledge that we live in multispecies societies, they do not infer from this that such enhancement and pervasive management of life, which also relies on an ecologically inflected version of transhumanism, is not at all sustainable in multispecies terms.

In his most recent book, the new media theorist and digital artist James Bridle (2022) also discusses the postdigital condition, referring to many examples of the biodigital sphere. However, many of the examples that Bridle considers take nature and its living beings as inspiration for technological improvements, which, although more ecologically aware, still sees zoa as models and humans as, if not the inventors, then the managers or recipients of such inventions. Analogously, research in the field of biomimicry, in which animal behaviors, organic substances, and natural techniques are recreated in industrial applications, relies on the pluripotentiality of life as the new "driving force of technological innovation" (Johnson and Goldstein 2015, 4) without transforming the current technosocial infrastructure and its power asymmetries. On the contrary, biomimicry even builds new enclosures under the guise of transgressing existing boundaries, "customizing [...] other species to human ends" (Salter 2015, 17).

The digital sociologist Deborah Lupton takes a different position. Some years ago, she wrote about digital data as companion species (Lupton 2016), following Haraway's suggestion that companion species are all those post-cyborg entities coevolving with humans, which create lively, generative assemblages. More recently, Lupton (2023) has recognized that the cyborg figuration can provide the basis for a reconsideration of the emergent ontologies of what we have called cyberzoa, even though she does not go so far as to formulate a critical cyborg theory for the animals that assemble in cyberzoa. She instead describes how new technologies contribute to human-animal relationships at a micro- and macro-political level: a series of technological interventions more or less directly become part of such relationships – from smart devices for datafying wildlife to the e-waste of technological corporations – and the consequences of these configurations need to be carefully handled. Lupton also notes that when the One Health perspective is adopted, the focus tends to be on risk prevention for the human, with the consequence of further instrumentalizing the more-than-human. Some examples include the Internet of Animals, when, for instance, insects are equipped with devices for monitoring climate change, and the numerous projects in which animals that are considered to be pests are geolocated in order to contain and control them.

Trying to overcome the anthropocentrism of the One Health approach, Maya Livio and Laura Devendorf (2022) have written about the "eco-technical interface" regarding "the increasingly complex boundary between humans, the more-than-human world, and human-designed technologies" (ibid., 1). They note that nonhuman lives are usually instrumentalized by the pervasive embeddedness of technologies in the environment and cannot enjoy the possibilities reserved for humans as the only beneficiaries of the value that these new connections produce. Although Haraway is not the primary source in Livio and Devendorf, the boundary condition of the eco-technical interfaces that they describe can "facilitate or constrain relations" among all animals and machines just like the cyborg's liberating or oppressing sides (ibid., 2). They believe that foregrounding the eco-technical interface in design (see also Westerlaken 2020) could be a way of avoiding the further instrumentalization of animals and, at a minimum, providing greater awareness of nonhuman lives and their needs because the difference between care and instrumentalization is easily blurred in cyberzoa.

Among the fields of study focusing on the convergence of the living and the digital is the new field of Animal-Computer Interaction (ACI). Expanding the field of Human-Computer Interaction, ACI emerged "within a cultural climate in which old oppositions between

human agents and natural resources are being increasingly questioned" (Mancini 2017, 130), and which considers animals as stakeholders for designing user-centered and possibly also participatory technologies, ideally leading to designing technologies not only with but also for animals. As Clara Mancini says, ACI deals with animal-computer interactions in the animals' contexts of belonging – be it a savannah, a factory farm or a medical laboratory. ACI is oriented to designing technologies that improve "animals' life expectancy and quality" (Mancini 2011, 70), while also giving them control over the processes that involve them, to minimize negative effects, avoid side effects, and improve interspecies communication. She argues that ACI should always be aimed at animal welfare and autonomy and always obtain their consent. But how can the principles of ACI be implemented in "environments" such as factory farms where animals can never have autonomy because they are "kept" there without being able to enjoy their Umwelt or experience a condition of well-being?

There is an enormous difference between ACI's ethical approach, which is aware of the tensions posed by the asymmetries of existing species, and the promotion of smart farms as a guarantee for the consumer that they can freely access all possible data about the "product" (Jukan, Masip-Bruin and Amla 2017). However, to deal with unanswered questions, ACI scholarship could benefit from navigating the contradictions it encounters (Mancini, 2017) and looking at the "contexts" that surround the design stage, in which cyberzoa are also configured and technosocial relations take place. Perhaps it is not a matter of enabling animals "to make technology happen" (Mancini 2017, 133), but of enabling technologies to let animality happen.

3. Reconnecting ecology and technology within Feminist Technoscience Studies

Notwithstanding the multiple ecological openings offered by the feminist cyborg in Donna Haraway's formulation, the ecological potentialities of this figuration have either been ignored (Hables Gray, Figueroa-Sarriera and Mentor 1995, 2021; Kirkup et al. 2000) or have not been sufficiently focused upon (Grebowicz and Merrick 2013) in most of these debates. Although Feminist Science and Technology Studies have continued to interrogate the constitutive practices of technoscience and their interspecies entanglements (Ferrari 2015), especially concerning biotechnologies, in general a residual humanism has characterized the cyborg interpretation in recent decades. Whereas the figuration of the cyborg has provided fertile ground for scholarship related to the posthuman turn – in fields ranging from philosophy to the performing arts – its potential has unfortunately not gone so far as to erase residual anthropocentrism. A misleading narrative also emerged about "the two Haraways", separated by a presumed Harawayan turn starting from the second manifesto (Haraway 2003) and culminating in her last book (Haraway 2016). Of course, we now read the cyborg in a different historical moment, aware of the meanings of "companion species" (Haraway 2003) and "compost society" (Haraway 2016). Nevertheless, many passages in Haraway's work follow the links between the ecological and technological (Haraway 2004b), which also serve not to separate ecofeminism and technofeminism (Haraway 2004c).

Stacy Alaimo (1994, 133) is the only researcher in feminist scholarship who has already

attempted "to map out a feminist ecological position within and between the cyborg and ecofeminist poles". She notes how the blurring of the boundaries between women, nature and other animals has frequently played on the side of patriarchy and technocracy rather than benefiting the multiple subjects of feminism. The same risk is inherent in the cyborg: "Are the pleasures of boundary confusion appealing enough to disengage a technophilic ideology from a phallocentric politics of domination?" asks Alaimo (ibid., 148). On the one hand, she warns against any acritical glorification of nature and "a conservative environmentalism" (ibid., 137). On the other hand, she considers the figurations of the coyote as more "effective agents for environmental politics" (ibid., 194) than the cyborg. Why the coyote? In some traditions, particularly those of the Native Americans, the coyote plays an important role as a trickster, whose goal is a reversal of the status quo (Timeto 2020). The coyote is a figure of trouble, mingling, and transformation, which can never be taken under complete control. For Haraway, nature is inappropriate/d like the coyote, and so should feminism, which in her view should always escape identification as well as identitarianism (Haraway 1991a; 1992). However, Haraway affirms that the coyote, just like the cyborg or the Oncomouse™, is not a "natural" figuration at all, but is part of a queer family that does not depend on blood ties and includes many other actor-networks falling between nature and culture (Haraway 2004a).

Given the centrality of standpoint epistemology for feminist cyborg theory, it is also worth considering the ecological expansion of situated epistemology formulated by Christina Hughes and Celia Lury (2013), who propose a "thickening" of already existing trajectories to encompass more-than-human lives, stressing the consequentiality of epistemological approaches and interventions. Hughes and Lury suggest:

> a re-ordering of the hierarchy of socio-material relationships in ways that dislodge the human from its apex; a refocusing of agency within practices, including methodological practices, rather than discourses; a returning to the politics of knowledge rather than that of identity; and a retooling of understandings of relationality and change. (Hughes and Lury 2013, 787-788)

As they note, as many sides as actors are involved, which decentres the speciesism hierarchy that privileges the human perspective and requires a multiplication and further decentring of standpoints and their ecological reframing. This move is at the same time epistemological (it makes room for multiple, beyond-the-human perspectives, and their performances), ontological (it dismantles essentialism and human exceptionalism), and political (it prioritizes respectful practices based on the acknowledgement of constitutive relationalities). As Haraway writes, we must learn "to see together without claiming to be another" (Haraway 1991b, 193): cyborg epistemology is situated epistemology, which, not being a human prerogative, makes it well-suited to becoming the epistemology of cyberzoa.

Multispecies co-fabrication and the negotiation of reality at borders (including the borders of disciplines), the asymmetry of partial connections, and the importance of taking sides are some significant aspects of the ecological return to situatedness, as foregrounded by Hughes and Lury based on what the cyborg figuration already makes possible.

4. Refiguring the actors in cyberzoa

This section discusses the importance of considering the composition of heterogenous assemblages as one including humans and both machinic and animal nonhumans, drawing on Haraway's cyborg theory. Indeed, lives are always a matter of composition (Haraway 2008). Both machinic and living things are and form compounds (ibid., 250), i.e., technosocial, naturecultural assemblages working through conjoined heterogeneous agents whose encounters can have very different outcomes. Whereas, more recently, the post-posthuman figuration condensing this concept has become that of the compost (Haraway 2016), in the first manifesto (Haraway 1991a) Haraway still privileges a computer vocabulary and rather focuses on interfaces: she discusses the "informatics of domination" of the "integrated circuit" restructuring women's lives "through the social relations of science and technology" (ibid., 165), and the translation of bodies into codes in both communication technologies and biotechnologies.

The feminist cyborg is an interfacial, historically situated figuration (Haraway 1997) imagined liberating the capacities of interfaced bodies and empowering rather than endangering them. The cyborg stands at the interface between automatons and autonomy, nature and culture, and the organic and inorganic. It engages in the interrogation and rearrangement of the boundaries of human and nonhuman animals and machines, between them and within them. What compounds, interfaces, and compost share, beyond differences in definition, is the fact that humans lose their self-sufficient centrality and nonhuman animals are seen as also endowed with a social agency in them.

For the sake of our argument, it is worth considering an extended footnote in *The Promises of Monsters* (1992, n. 14, 332), in which Haraway critiques Bruno Latour and what she calls his "impoverished collectives". This note comes at a point in the text in which Haraway elaborates on the role that the objects of knowledge have in the processes of knowledge production and the mutual, often unequal, structuring of all material-semiotic actors in these processes. To better understand this controversy, it is helpful to consider what the essay more broadly addresses. Here, Haraway explores what we mean for "nature", foregrounding the continuity of epistemology, ontology and politics like in *A Cyborg Manifesto*. Nature is not an essence or a resource, and even if it can be a commonplace, a topos – which does not imply that it is a textual object without material reality – it is never a given, but always artefactually done by its heterogeneous actors, none of them in the position of mere resource, passive matter or instrument. Articulating the representation of nature is thus necessary to avoid "distance effects" and ventriloquisms and pay attention to these relations and implications in action.

In the abovementioned note, Haraway agrees with Latour that the processes of artefactual co-constitution of nature require "delegating competencies" (Haraway 1992, 298), as Latour would put it. In the context of Actor-Network Theory, delegates refer to actors crucially mediating other actors' functions and actions, extending their technosocial networks. At the same time, Haraway argues that the notion of delegates in Latour's collectives needs to give a proper account of the non-negligible component of such collectives. Cyborgs gather many more actor-networks of technoscience (Haraway 2004c, 307) than Latour's account foresees. Thus, for Haraway, a sociology of technoscience solely considering machines and humans with machines, is incomplete:

> The interfaces that constitute the "collective" must include those between humans and artifacts in the form of instruments and machines, a genuinely social landscape. But the interface between machines and other nonhumans, as well as the interface between humans and non-machine nonhumans, must also be counted in. Animals are fairly obvious actors […]. (Haraway 1992, 332)

The symmetrical consideration of machines and humans leads many Actor-Network theorists to forget that cyberzoa also include other animals. Furthermore, the fact that machines perform social relations, and their inequalities requires that systems of exploitation and their political implications are more explicitly addressed as a crucial component of the technical content of science without the need to return to the social/technical binary (ivi; see also Wagman and Parks 2021). Feminist cyborg studies are aware that "metaphors matter" and "how metaphors (are) matter" (Cowan and Rault 2022, 6). Machines perform sexism and racism, and they also perform speciesism, i.e., the presumption that human beings are superior to other living beings due solely to their species belonging. Speciesism weighs on how nonhuman animals connect with technologies, influencing whether they are equated with the machine pole or can be empowered by the connection like their human counterparts. It is thus paramount to address the question of cyberzoa.

These systems of domination already mark the story of the first cyborg created after a series of experiments at the Rockland State Hospital in New York (Clynes and Kline 1995). These took place in a cyberzoa configuration that involved many human and nonhuman actors, including a rat, an osmotic pump, the scientists, and their institutional and commercial networks: Manfred Clynes and Nathan Kline used the rat as a model for understanding the empowering effects of neuropharmacological implants on the human body (of the male astronaut) launched in outer space. Specularly, Theseus, the mechanical mouse invented by the computer scientist Claude Shannon in 1952, is a tiny zoo-robot able to orient in a maze by trial and error, thanks to a series of relay switches located under the maze (one of the first examples of machine learning), which served as a model for the behavioural psychologist James Watson's experiments on living mice that were sensorially deprived so that they could behave like automata – that is, without autonomy (Timeto 2020). These are only two of the many possible examples of cyberzoa in which asking who blurs the boundaries, from what position, and for what reason matters, since not all partial bodies are equally positioned when they enter technosocial connections, nor do they perform their existences in the same way. If some can be empowered by these "fusions", others may, on the contrary, be annihilated to the point of "ontological collapse", the expression that Zipporah Weisberg uses for the conflation of transgenic animals and techno-economic apparatuses (Weisberg 2009, 41).

5. Conclusions: Towards a theory of cyberzoa

Cyberzoa are multispecies (human and nonhuman) animal-machine configurations, and the eco-techno-social relations that compose them come with multiple optics and positionings. Haraway's works offer many openings for an environmental politics of cyberzoa with-

out the nostalgia for a lost Eden that seems to guide, for example, current experiments in de-extinction. "Refiguring the actors" of technoscience (Haraway 1992, 297) is an essential step towards the achievement of naturecultures that "ha[ve] many houses with many inhabitants which/who can refigure the earth" (ivi). Refiguring, though, means paying attention, implies respecting and should lead to acting differently.

Following these suggestions, this paper tried to envision some helpful starting points for a theory of cyberzoa that draw on the ecological features already present in the feminist cyborg figuration and take them beyond. To refigure the ecology of the cyborg and get rid of the residual anthropocentrism that the posthuman interpretation of the cyborg still retains: first, the most often ignored boundary breakdown between the human and the nonhuman animal must be included when discussing the interfacial condition of the cyborg, a starting point for an ecological opening and employment of technoscience; second, the species performances of the machine should not be ignored. A cyborg theory for the animals goes beyond acknowledging that nonhuman animals are part of the technosocial collectives in which we live together with machines and requires that theoretical and practical perspectives are reoriented in a post-anthropocentric, not solely posthuman, direction. Paying attention to nonhuman animals means being aware that technosocial relations of cyberzoa perform inequalities and systems of exploitation that call for a simultaneously situated and ecological consideration of "symmetry", to reconnect the onto-epistemology of the cyborg to its politics in an expanded eco-technical environment.

Technosocial relations are performed in context, meaning that technologies are ecological since they are used in specific ecologies and contribute to maintaining, altering, or co-creating them. If situated epistemology is the epistemology of the feminist cyborg, an ecological situated epistemology (Hughes and Lury 2013) is well suited to become the epistemology of cyberzoa. A theory of cyberzoa will need a politics of knowledge that considers how its multispecies actors are positioned, whom the extended technosocial relations of cyberzoa benefit, and whether animals' encounters with machines take place in ways that are active and empowering for them or lead to further instrumentalization.

A theory of cyberzoa will question whether nonhuman animals can experience, in different moments of their involvement, from design to actual use, the same possibilities that the cyborg potentially offers to human animals, that is, if such machines and assemblages can work *for* the animals as well as being as, on and from them. Questions such as that of Mancini (2017) on how animals experience a change in interaction with technologies should be explored further, considering what kind of human-nonhuman relations are made possible through the mediation of technologies, for whom, and for what reasons, but without overlooking the contexts. An investigation of unequal power relations and different social relations is paramount: an ecological refiguration of the cyborg will start from here since no optic comes without a positioning (Haraway 1991a). From a feminist cyborg perspective, considering cyberzoa means paying attention to the inequalities and risks at stake, rather than just the possibilities, which should be promising for all the lives involved.

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