

Enter cyborg: tracing the historiography and ontological turn of feminist technoscience studies

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Abstract:

The cyborg is a figure we now easily connect with early 1990s feminist technoscience studies, indeed it is a foundational figure of the field. However, cyborgs do not just trace older, but also a lot more ambiguous and less feminist roots within our technoscientific modernity. The aim of this article is to provide a genealogical map of feminist entanglements with especially the biological sciences and with the body. In particular, I aim here to show how the figure of the cyborg in fact might be positioned as the first sign materializing and anticipating what we today might call the ontological turn within feminist theory and technoscience studies.

Keywords: cyborg, body, Donna Haraway, new materialism, ontology, Posthumanities, feminist technoscience.

The figure of the cyborg has become something of a mascot within feminist engagements with issues of technology and the identity formations of the modern human Self. For all the hype, the cyborg is undoubtedly a widely celebrated and debated figure (Franklin 2006). It looms largely over feminist questions regarding the possibilities of technoscience to change the world as we know it. After all, change persists as the *sine qua non* of feminism. Furthermore, despite humanoid misconceptions, the cyborg remains key to materialist understandings within feminist theory today. The aim here is to map out the historiography of the cyborg in order to be able to make an argument for how the cyborg, as a condensed figuration of both material reality and feminist/popular imagination, in fact works well as an entry point into the contemporary turn to ontological issues within feminist theory and technoscience studies. Perhaps the imaginative materialisms of the cyborg registered in ways not expected in the feminist debates of the 1980s and 1990s over for instance new reproductive technologies. Especially as these debates were mainly taking place within a frame of cultural criticism, humanities and the social sciences, or set within humanistic ideals

as they still permeate scientific discourse, popular media and our contemporary social imagination. In fact, such limitations still flavours much feminist technoscience studies.[1.]

This article, however, offers an accessible introduction to the feminist historiography of the cyborg and how it became a feminist tool for thinking nature and culture differently. It traces a figure that in fact defies all kinds of origin stories. Importantly, the cyborg is here not asked to finally perform as *the* feminist answer to contemporary technoembodied subjectivity or the modern logic of human identity in general (Latour 1993). Instead, it works here as both a starting point and a continuation of a long feminist engagement with biology and ontological matters that reaches well beyond the usual comfort zones of humanities, humanist ethics and other human supremacist norms. It is here argued how the cyborg becomes both a breaking point for gender constructivism and cultural theory, and an entry to a feminist commitment to posthumanities. Thus, the aim here is to re-route the historical cyborg understandings, and situate them within contemporary feminist commitments to ontology, to the emerging discourse that, often sloppily, is referred to as the material turn (as if materialisms were new phenomena in the humanist imagination). I provide here a cartography of various feminist, scientific and humanist confrontations and experimentations with technoscience, and their discontent. Here thus, I map out feminist technoscience studies as reloaded in affinity with the figure of the cyborg and as a form of posthumanities. But let me first introduce the cyborg. [2.]

Enter cyborg

It is a dubious type, the cyborg. As the warrior figure one might recognize from the movies, the cyborg is a hybrid, not entirely human and not entirely woman. Cyborg, we quickly learn, is short for *cybernetic organism* (Gray *et al* 1995). In contemporary popular culture, cyborgs, as hybrids of bodies and technology, flesh and steel. They are often highly gendered incarnations of either sexy femme-bots or hard-boiled terminator masculinities. Most often a destructive man-machine in science fiction, cyborgs figure as ultra-gendered (rather than feminist) fighters in *Terminator*, *Bionic Woman*, *Robocop*, *Matrix* and *Ghost in the Shell* to mention only a few. Simultaneously biology and technology, cyborg bodies seem infused with highly visible implants. In the visual register, there is obviously nothing purely innocent or natural with cyborgs. So, how come the cyborg became such an iconic figuration of materialist feminist theory? What kinds of problems in regards to the body, to biology and to technoscience was raised by feminists and re-issued with the advent of feminist cyborg studies? Clearly there are various positions in the recent decades of feminist engagement with

technoscience, so what are the different feminist approaches to biology, the arena of the body, and to the natural sciences? How did feminists as trained natural scientists, such as Donna Haraway, Lynda Birke, Ruth Hubbard, Anne Fausto Sterling; Lisa Weasel, Evelyn Hammonds and Karen Barad, and many others, challenge our assumptions of the scientific way of life? To get to the nitty-gritty, or why the cyborg after all became such a big deal, in what way does the feminist takes on the cyborg address the problems of the natural and the biological? And finally, with a bit of revitalised cyborg history in mind, what are the potentials of cyborg ontology for contemporary discussions on materialities and posthumanities within feminist cultural studies and feminist technoscience studies? These are some of the questions this article set out to answer. [3.]

History of the illicit offspring of worlds at war

The queer off-spring of neo-colonial science and super power militarism, the cyborg had two patriarchal fathers of conception. Leaving the homosocial and imperial desires implicit in much science activity untapped (Traweek 1988; Kosofsky Sedgwick 1990), it suffice to say that the two men who coined the very term cyborg had far-reaching visions. Scientists contracted by NASA, Nathan Kline and Manfred Clynes published a radical article, “Cyborgs and Space” in the scientific journal *Astronautics* 1960 that envisioned the potentials of enhancing the human body for space explorations. The body could be modified to endure the hostile environment of outer-space with the help of, for instance, self-regulatory devices such as adrenaline pumps directly inserted into the heart, exoskeleton space suits and even, more long-term, genetic engineering to augment the oxygen and breathing capacity of humans. Cyborgs, they imagined, would drastically improve the chances for the USA in the hypermilitarist cold-war “space-race” with what was then called the Soviet Union. This was a political period when the world was violently divided by the iron curtain into West and East, NATO versus the Warsaw Pact. The cyborg was the answer to super-charged questions of global politics. It was a matter of conquering more space, both outer-space and the inner biological space of the body, at a historical conjunction when every inch of the globe was to be claimed, colonized and monitored by military satellites many times over. [4.]

Cyborgs could operate according to the military logic of C3I; command-control-communication-intelligence (Haraway 1991:164). Blunt force was replaced by smart cybertechnologies for effective regulation, guidance and steering. Cybernetics, the science of feed-back and regulation, engineered control and communication, in living organisms as well

as in stealth airplanes, was modelled onto the human body and society. The term cybernetics comes from the old Greek word, *kybernetes*, for pilot, rudder or steersman – also the root to the word government. Clearly, politics is already involved. The steering of information, genetic or computer generated, was of the essence. As this was clearly a case of “biopolitics”, to use Michel Foucault’s term for the coercive and normalizing strategies (or “gouvernementality”) of population management (Foucault 1977), it is also about bodies and the power over life, about how to discipline and regulate bodies and mould life itself. Cyborgs were for Kline and Clynes bodies with integrated artificial feed-back systems, they were man-machines or animal-machines, super-enhanced hybrids of flesh and technology. So the cyborg was born a figure of war and imperialism. It was a science fantasy of man-made generations of hyper-masculine warriors that echoed in the therapeutic imagination of popular culture, in B-movies and science fiction TV-series like the *Six-Million-Dollar-Man*, *Star Trek* and in Hollywood productions such as the Terminator films. We dreamed of cyborgs, as enhanced or ultra-human humans, ideally fitted with superior intelligence and a cognitive mastery to match the artificially made ideal bodies with supernormal physical abilities and strengths. This was the cultural fantasy of cyborgs as *postbiological* entities, superior beings that embodied a range of humanist Enlightenment ideals of cognition (Descartes’ rationalist assumption about the human constitution; *cogito, ergo sum*); of the conflation of humanity and white European masculine individuality (as critically echoed in Franz Fanon’s *The Wretched of the Earth*). But cyborgs were in the era of the Cold War already much more than mere science fiction. They were soon enough science fact. It happened swiftly and widely on the local scale of things mundane. As laboratory rats with implanted osmotic pumps distributing the exact right dose of a substance for medical trials, as human patients with pace makers, artificial organs or other prosthetic devices, a combat pilot sensorially attached to his warcraft interface, or as women on the pill, regulating their internal hormonal levels, cyborgs proliferated as both life sustaining and life threatening figures of late modernity. Cyborg technologies prolonged life, maintained the human body, but as in the case of the cyborg pilot or the formula-one driver, they also extended and enhanced it, created “Man-plus”. [5.]

Today, the wide range of human-machine couplings defies definition, from the quadriplegic patient totally relying on high-tech equipment to every baby who is immunized (also a mundane biotechnology we survive by nowadays) from swine flu or the measles. As an historical figure, the cyborg embodied the destructive as well as reproductive powers of modern science, like atom bombs, biochemical warfare and techniques for artificial

insemination and fertilization that helped childless couples at fertility clinics, but also formed the basis for the burgeoning life sciences with reproductive cloning, genetic modification and the commodification of body parts, making for instance genes, ova, embryo and uterus into property (Thacker 2006). It was a figure embodying promises as much as threats regarding the future of our bodies, ourselves. At this particular post-world war conjunction in time and space, bodies, identities and the scientific discourse of biology was powerfully re-defined – and feminists had high stakes in these changes. [6.]

It was not only a matter of gender equality in academia. The cultures of Modern Science, birthed in 16th century Europe, had not simply excluded women, they were *defined in defiance of women*, as forcefully asserted by historian of science David Noble (1992: xiv). Feminist science scholar and trained biologist, Lynda Birke (2000:1) phrased the feminist problem with biology in a striking manner, “(w)omen have long been defined by our biology. It is a familiar story; anatomy is destiny, our hormones make us mad or bad, genes determine who we are”. A grand old lady of feminist science studies, Hilary Rose, and a handful other critical scientist, dissected the prevailing sociobiologist arguments from the late 1970s (of which some hold sway today in popular genetics and evolutionary psychology). Basically, the sociobiological arguments reduced aggression, territoriality, racism and male supremacy to genetic programming. [7.]

The “biological facts” of male heterosexual philandering, female sexual coyness, and even the genetic ‘inevitability of patriarchy’, selfish-ness and capitalism, were, according to famous male sociobiologists like Richard Dawkins and E.O. Wilson, inextricable obstacles to feminist demands. As highly prejudiced against women as for instance anthropometry (the 19th century science of measuring the human body) ever was, their arguments did the work of providing a sense of scientific certitude about not just the physical, political and intellectual inferiority of women, but also about the societal usefulness and legitimacy of making such comparisons among races, classes and sexes (Gould 1980; Bleier 1984). Feminism was also for them unnatural, while feminists on the other hand claimed that these powerful men used their scientific authority to underline societal norms and democratic problems rather than biological facts. In fact, these arguments returned with a vengeance as the principal of Harvard University, Larry Summers in a controversial speech in the summer of 2005, announced that the striking statistical unlikelihood of women becoming professors at the university probably were a result of their genetic programming. Arguments such as these imply of course that

there is no action that can be taken to amend the extreme masculine gendering of scientific top-positions; it's in "the nature of Man" – *as if* this would be a stable referent, an unchanging fact of life unaffected by masculinism, human exceptionalism and specieism (Haraway 2008). [8.]

It is not surprising why feminists have opposed such *biological determinism* since to be determined by biology for women signified a denial of the possibility of social change and a surrendering to limitations. However, feminist scholars, like Emily Martin (1987), Donna Haraway (1989) and many others, investigated and critiqued how the body, biology and "the natural" in such sociobiologist narratives rather were used as foil for dominant ideologies of gender, class, sex and race. Essentialism was to become a bad word, and questions of ontology (about the substance and being of human and other creatures and things in the world) pushed aside for the politics of epistemology, theories of how certain knowledge gets produced and under what conditions statements become regarded as true. [9.]

The trouble with biology

The main focus of feminist approaches to biology has been a serious critique of the ways in which nature has been understood as gendered (Bleier 1984). Ontological issues, by implication, were regarded suspiciously if they involved anything but representationalist explanations about the role of the sociocultural power relations. This is perhaps not so surprising to us today. A characteristic of Western science throughout the modern period, the world has been divided into nature and culture where culture stands for the change of humans across time and space while nature stands for the untouched, given and unchanging true world. Of course feminist theorists favoured the political potentials of culture, above the unfriendly domains of determining biologism, or the natural sciences. Perhaps they on occasion mistook rampant biologist discourses for the forces of natures themselves? As if science (including biology) did not have a changing social history of its own while being our social authority on biology, as do nature (in the form of evolution). Figuratively speaking, the 'nature of Nature' was question in many ways symbolically linked to the nature of 'Woman' and 'Native' as opposed to 'civilized Man' (cf. Bryld & Lykke 2000). Race and gender was in dominant social and biological imagination defined in terms of difference understood as natural hierarchies that should be reflected in how society was ordered. Such questions of difference, it was thought, could also be answered once and for all by biology. Sustained by the authority of science, biology was the way to gain knowledge about society. [10.]

One of the main feminist tactics for critiquing this large belief system and worship of the natural as model for the social was to point out how the very institution of science was not a neutral producer of knowledge of nature. Rather, science was cultural, part of gender divided society and part of historical changes. Historians of science exposed past truths, scientific facts and ways of understanding nature as the shaping of knowledge in accordance with societal norms of gender. Carolyn Merchant's *The Death of Nature: Women, Ecology, and the Scientific Revolution*, published in 1980, need a special mentioning as pioneering feminist study of science as culture with a social history of its own. It was an ecofeminist thesis connecting environmental history, feminist theory with history of science. A view of the 17th century Scientific Revolution was here presented that challenged the hegemony of mechanistic science as a marker of civilisatory progress. Merchant argued that seventeenth-century science could be implicated in the contemporary ecological crisis, the domination of nature and wild others, and the devaluation of women in the production of scientific knowledge. [11.]

The history of science exhibits many examples of how scientists have projected the social inequalities of race, class and gender onto nature so that nature in return seems to be illustrating cultural assumptions about societal divisions and hierarchies (Merchant 1980; Schiebinger 1989; Jordanova 1989; Sterling 1995; Spanier 1995). The parts of biology where such societal differences has been inscribed or essentialized ranges from blood, genes and hormones, to the face, the fetus, the genitals, the brain or the bones (Barker-Benfield 1975; Gould 1980; Mol 1989; Laqueur 1990; Oudshoorn 1994; Hammonds 1997; Haraway 1997; Klinge 1997; Beaulieu 2000; Roberts 2003). Thus, feminists have for good reasons denounced biologist explanations of the social conditions of women. [12.]

One manner of resisting biologist explanations, if looking at feminist theory from Simone de Beauvoir to Judith Butler, has been the radical insistence on the social construction of gender. Simone de Beauvoir wrote famously in 1949 that "One is not born, but rather becomes a woman". Donna Haraway argued that "all the modern feminist meanings of gender have [their] roots" in this now famous line (Haraway 1991:131). The separation between socially constructed gender and biological sex enabled feminists to contest the belief that social inequalities of women was rooted in and thus also justified by biology. The sex/gender distinction allowed for an explosive field of studies on the variety of power imbued, gendered

constructions in history, society, medicine and science. A touchstone of feminist work since then, gender, as opposed to biological sex, has been deployed to explore the social construction of sexual difference and debunk the idea that “anatomy is destiny” (Freud 1931). The problem is that the sex/gender distinction of feminist scholarship echoes the nature/culture divide. [13.]

Feminists tried to work around, or through, this problem differently. Scientist Ruth Hubbard (1990) argued that women’s physics, more than men’s, had been socially constructed through biological discourse for political purposes of domination. Further, that biology had been perceived and interpreted through a patriarchal cultural lens, but, importantly that also cultures actually shaped biological (physical) bodies. In that sense nature and culture, sex and gender are hard to distinguish when it comes to concrete instances of human behaviour in different cultures (Hubbard 1990). So, clearly it is not the case that feminists have forgotten about the biological in all kinds of various work from the 1970s and onwards (cf. Grosz 2004; 2010). In fact it has often been carefully problematized through a range of work. This then, is an argument in itself for the importance of a historiography of feminist technoscience studies, so to not, as pointed out by Sara Ahmed (2008), routinely describe all feminist scholarship as automatically shying away from biological problems. As we will see in the following, the approaches to the body have since the 1970’s within the vast area of feminist work (on embodiment, science, medicine and technology) been various – sometimes even split and contradictory (Butler 1993; Grosz 1994; Kirby 1997; Bordo 1998; Wilson 2004). [14.]

Importantly, feminist takes on science and biology were never univocally in opposition to or against the biological sciences as such. For instance wrote Shulamit Firestone, one of the pioneers of the New York Redstockings, in her programmatic *The Dialectic of Sex* (1970) about the appropriation of medicine and reproductive work as the way to emancipation. Science and technology was to free women from work and childbearing, production and reproduction as the corner stones of the capitalist society Firestone wanted to revolutionize (Franklin 1998). Except abortion, reproductive technologies, like artificial insemination and gestation outside the womb (only the latter, called ectogenesis, is still a fictive technology), were to free women from pregnancy, child birth and nurturance as the major obstacles for women’s liberation in Firestone’s utopia. The fundamental issue in Firestone’s view was on the control of and power over women’s bodies, especially with respect to fertility and sexuality. The location of the problem was *within women’s own bodies* and the application of

a neutral technology would bring an end to biological motherhood and make sexual equality a real possibility. The *technophilia* of Firestone, her strong belief in the power of science, was by no means the only feminist perspective on science and technology of early second-wave feminism.¹ Even Firestone paid critical attention to the contemporary state of affairs where science, medicine and technology facilitated oppression, marginalization and exclusion (cf. Lykke 1996:2). The enthusiasm of Firestone over the future possibilities with artificial wombs was not shared by the growing feminist resistance to misogynist applications of genetics and reproductive engineering (such as embryo screening and sex selection where suspected female fetuses were, and still are, aborted). The most prominent voices came from a group of radical feminists called FINRRAGE, short for Feminist International Network of Resistance to Reproductive and Genetic Engineering (e.g., Arditti et al, 1984; Corea et al, 1985). They saw the development of reproductive technologies as a form of patriarchal exploitation of women's bodies. In this view, in many ways opposite to Firestone's, biological motherhood and maternal thinking was reclaimed as in stark opposition to destructive and self-possessed masculinity. Reproductive technologies, inextricably linked within FINRRAGE to genetic engineering, the making of so called designer babies and eugenics, were seen as threatening women's unique source of power and risked reducing women to birth machines in what one spokeswoman, Gena Corea (1985), foresaw as "reproductive brothels" much like how large-scale farmers breed animals today. Reproductive and genetic technologies were seen to be about conquering the last frontier, about gaining power over "life itself" and hence giving men the ultimate control over nature. This view is similar to that developed within eco-feminism where biological warfare, imperialist biopiracy and the ecological effects of modern technologies are products of a violent patriarchal Western culture (cf. Shiva & Moser 1995). The Scientific Revolution of the 16th century, argued eco-feminists like Vandana Shiva, made Westerners quit seeing earth as an organism to nurture and instead exploit nature as a resource for the sake of progress. They raised important issues regarding uncritical celebrations of science, or *scientism* as the view that scientific explanations hold primacy over all other religious, spiritual or philosophical interpretations of life. [15.]

In that sense, feminist tended to approach science as determining (as eco-feminists and FINRRAGE) *or* neutral (as Firestone), arguing implications for women that is either over-

¹ Technophilia is the opposite of technophobia. Technophilia signifies a strong enthusiasm in relation to scientific and technological progress in relation to societal development while technophobia signifies a fear for how societal reliance on technology might lead to dehumanization. Both these extreme positions share an immense belief in the transformative powers of science and technology.

pessimistic or over-enthusiastic. Science is patriarchal and capitalist in the first case, exploiting nature and indigenous people, making women victims of masculine technology as an inevitable extension of men's desire to control women's biology. The latter case, where science and technology is seen as neutral, makes oppositional political conclusions. Science is a neutral tool for liberating women trapped in their reproductive bodies. Such 1970's optimism of Firestone can also be traced in the techno-enthusiasm of 1990's *cyberfeminists* who sometimes viewed electronic media and the internet as a place where bodies became redundant and feminism could prosper subversively like a virus (Plant 1997; criticized in Braidotti 1995). [16.]

On the one hand, the body has always been central to the early second wave analysis of power relations under patriarchy (Firestone 1970; Mitchell 1974). Feminism made the body an issue and a rich scholarly topic that since then has developed in various ways and been acknowledged to some extent within the emerging field of body studies (Davis 1997; Fraser & Greco 2005). Body studies of all kinds owes in that respect to feminist work. This is true for instance regarding the body studies core notion that feminization and racialization of *any notion of the body at all* indicates a "Cartesian dualism" putting mind and disembodied white masculinity in the unmarked category of *a priori* given, which is anything but neutral. On the other hand, also within feminist studies has the biological body been pushed aside in its real, material and fleshy dimensions, as argued by feminist biologist and science scholar Lynda Birke (1999). The body has been favoured merely as a cultural entity. However important in their own right, admits Birke, sociological and feminist theories about the effectiveness of representations and cultural inscriptions on the body surface, seem to have *made the actual body disappear in the process* which is somewhat ironic. Psychoanalytical explanations in such work have taken prowess over physiological understandings of inner bodily processes to the effect of leaving the interior of the body to the devices of traditional biomedical experts and authorities. As a trained biologist with links to early feminist health and animal rights activism, Lynda Birke argued for a bridging of the natural and cultural sciences on the body since the biological sciences can offer more than just deterministic narratives of how nature works. In that way she urged us to problematize assumptions about the natural body as fixed and unchanging, and moreover, to develop feminist science studies since not all things biological can be covered with sociological tools of analysis (Birke 2000). [17.]

Much like how women's studies grew out of the women's movement, feminist technoscience studies grew out of health activist movements, early feminist critiques of science and women's engagement with medical, ecological and scientific issues. This field can not be seen as another chapter in the history of how mainstream science and technology studies developed, but have specific roots of its own (cf. Lykke 2002:140). One root especially worth mentioning is the feminist medical self-help movement and the famous book *Our Bodies, Ourselves* initially published by the Boston Women's Health Book Collective (1971) and later distributed and rewritten by different women's communities on a global scale (cf. Davies 2002). Medical discourse have also been thoroughly investigated by feminists regarding issues ranging from old notions of hysteria and nymphomania, to modern ideas on premenstrual syndrome, post-natal depression and anorexia, and how women's bodies in contrast to men's bodies down to the letter of scientific articles on cells have been constructed as more susceptible to pathologies and ailments. Two classic publications in this regard have been provided by feminist anthropologist of science, Emily Martin; the book *The Woman in the Body: A Cultural Analysis of Reproduction* (1987) and the article "The Egg and the Sperm: How Science Has Constructed a Romance Based on Stereotypical Male-Female Roles" (1991). Sexuality, desires and sexual violence, alongside medical discourse and reproductive rights, have been an important focus of feminist scholarship on the body, as explained by feminist sociologist and body scholar Kathy Davis (1997:6). Beauty and fashion as well as cosmetic surgery have been explored as parts of women's embodied experiences (Bordo 1998; Davis 1995). It is, however, striking and ironic to what small degree feminists have worked on *male embodiment* in this respect. The links between racism, science and the body have been explored (hooks 1990; Collins 1990; Hammonds 1997; Mulinari 2004). "Racial types" was historically constructed by science to justify European colonial rule and slavery (however debunked by biologists today as racism). African women's bodies played a distinct role in the minds of male European scientists who imagined them as wild, physically excessive, untamed and closer to animals than white women (McClintock 1995, Fausto-Sterling 1992). Women's bodies function also as metaphors for the nation (like "Marianne" represents post-revolutionary France), making mass rape a devastating war tactic through the symbolic distinctions between "us" and "them", as studied by feminist conflict and ethnicity researchers (Cockburn 1998). Some feminists focused on the cultural or national construction of gender, some on women's embodied experiences, or women and men in the relation to both the metaphors and practices of science and technology. [18.]

If ever really left behind, the biological body as *both* a physical and a cultural entity was however picked up again by feminists trained as biologists or scientists, such as Ruth Hubbard, Ruth Bleier, Lynda Birke, Evelyn Hammonds, Pat Spallone, Anne Fausto-Sterling, Evelyn Fox Keller and Donna Haraway.² Such authors contributed to and formed a feminist fraction of the diverse field of *science and technology studies*, while often not properly acknowledged by their mainstream peers; they started making interventions in the very practices and discourses of science (Haraway 1997).³ These materialist feminists articulated crucial concerns that we today associate with the ontological, or material turn. They turned our attention towards issues of embodiment, nature and ecology, biological exuberance and the agency of the non-human (animals, machines, environments) - and perhaps most importantly, to posthumanist concerns of things outside of human control and language, like the liveliness of other organisms that co-constitute our existence but also the ways nature, animal and the wild are figures used to juxtapose human exceptionalism (Haraway 2008). Within various university departments the interdisciplinary nature of women's studies, sexual difference theory and gender perspectives gave thus birth to both feminists *qua* trained biologists, feminist cultural scholars of science and also feminist philosophers of knowledge. From all this interdisciplinary research it is possible to delineate four typical concerns or problems feminists have had with the biological body (cf Åsberg 2007/2009): [19.]

² The feminist research that followed in the late 1980s and early 1990s, the feminist forays into the natural sciences, ranged from deep-rooted close readings and critiques of bearing concepts and practices in science to epistemological reworkings of how knowledge claims could be made and judged. Drawing together insights from feminist theory, philosophy of science and the manifest accomplishments of working scientists, Evelyn Fox Keller (1985) pointed for instance to the constitutive role of gendered language in science. Present work of posthumanist or corporeal feminists, like Myra Hird, Elizabeth Grosz, Rosi Braidotti or Karen Barad focus a lot on the pre-discursive agency of other organisms, of non-human animals and biological issues beyond human control, or on the co-constitution of the material and the discursive.

³ Science and technology studies (STS) is a name for several approaches to science and technology as social phenomena. It is an interdisciplinary field of critical studies of science and technology in historical, philosophical and societal context. Already twenty years ago when prominent sociological theorists of knowledge, such as Karin Knorr-Cetina (1983) tried to describe the field, she found a difficult landscape to map out. She found it "impossible to identify a single set of characteristics" that unified the field (Knorr-Cetina 1983:1-2). Describing this disciplinary field is hard even while I would claim that nowadays is almost disciplinary in character with respect to its canonical texts and journals, established institutions and famous authors. Later cartographic efforts describe also a rather established field with a history, an origin story, of its own (Lykke 2002; Whelan 2001). It is often described as a field that moved from dealing with how social factors intruded upon science (so that science if done correct were free of anything "social") to a sociology of science focusing on the products of science, like truth claims, as constituted by social factors. Further it developed into dealing with the very process of doing science (Whelan 2001:544). The prime target of science and technology studies, writes feminist cartographer Nina Lykke, became the positivist notion of science as a self-developing entity transposed into a logical series of technological applications that determine societal development (Lykke 2002:139). Such simple assumption about the direction of progress, from a scientific discovery via technological applications to social development, is called *technological determinism*. Such technological determinism, based on the fictitious idea of distinct phases of innovation, was problematized with studies of how socioeconomic settings like late capitalism and research funding opportunities, and how technologies, like the very apparatus of the laboratory, shape science from the get-go.

The first is the trouble with *determinism*; that anatomy is supposed to be destiny. Biological facts about the body have been used for causal explanation, and at the same time as justification, of societal power differences. The feminist tactics to counter biological determinism was to make the strategic distinction between sex/gender and also to point to the social construction of biology and historical wrongs (especially race has been successfully problematized as a distinct biological category) regarding biological facts. A second concern has been the problem of *scientism*. Feminists have problematized the authority of science and the gendering of expertise, for instance in historical studies of how the practices and ancient knowledge of midwives was actively subdued by the emerging profession of male doctors and gynaecologists. Thirdly, feminists have been concerned with the *objectification* of the body, the troublesome idea that bodies are to be known from the outside - as if we, regardless of scientific status, were not actually all of us living and learning inside bodies. This relates to the fourth concern of feminists, namely the trouble with *disembodiment*, the priority and distinction of the mind and rational thought as if the mind was not anchored and thinking did not always take place inside a body. The counter strategies of feminists to these two latter problems have been to study science as culture and scientists as embodied, gendered practitioners embedded in societal norms. After the pioneering book, *The Science Question in Feminism* by Sandra Harding (1986), announcing a turn *from* the problems of gender representation among scientists and women's issues *to* the science question of feminist theory, the ambition was made explicit of engaging with the reality producing potential of science. This was the seed of feminist technoscience studies. Rather than asking how women can be more equally treated within and by science, feminists started to engage into the project of deconstruction, of changing science and producing scientific knowledge to less oppressive ends. They did it as "complicits from within", armed with feminist theoretical tools for alterative articulations and modes of thinking differently. [20.]

Haraway's cyborg and the feminist re-vision of biology

A professor of the History of Consciousness at the University of California, Santa Cruz, Donna Jeanne Haraway is widely regarded as a leading thinker of the relationship between technology and information on the one hand and bodies and the natural sciences on the other. Trained as a historian of science, but crucially with a PhD in biology, her work has become essential reading in feminist classes. Importantly, reading Haraway means engaging with a long tradition of feminist materialist struggles with issues of the body and the biological

sciences. A pivotal figure of interdisciplinary feminist cultural studies of science, Haraway has changed and influenced the fields of primatology, evolutionary biology and informatics as well as feminist theory, cultural studies and the cross-disciplinary field of science and technology studies (STS). She is a key contemporary theorist, but one with a remarkable knack for unexpected empirical examples and twisted cases drawn from both lived experience, our collective imagination and a variety of scholarly areas. Publications like *Primate Visions. Gender, Race and Nature in the World of Modern Science* (1989), *Simians, Cyborgs, and Women: the Re-invention of Nature* (1991) and *When Species Meet* (2008)- not to mention her perhaps most famous and controversial 1985 article “A Manifesto for Cyborgs” – has established her as one of the most evocative and challenging feminist writers around the turn of the third millennium. Approaching Haraway’s relationship to writing is necessary for understanding the promises she saw in cyborgs. [21.]

Haraway can be read like poetry. She is practicing what she preaches, i.e. science as story telling (Haraway 1989:4). In her writing, she is always implicating herself in the stories and critiques she makes, drawing on her own Catholic upbringing and interdisciplinary education in the USA context and situating herself in the midst of a complicated society and complicated disciplinary relations.⁴ She is situating her knowledge and herself as knowledge producer drawing on a wide plethora of sources.⁵ A passionate reader of science fiction, Haraway also saw the feminist potential of this genre, not just as it always reflects and comments on already existing society while the story is placed in the future or another unworldly setting. Rather, the utopian potential of science fiction for imagining a different world was for Haraway its feminist attraction. In a sense, imagination is reality production in process. Haraway was raised in a world profoundly shaped by small and large stories like evolutionary theory and Christianity. Not least the figures and practices of Catholicism like the *eucharist* (the sacrament of turning ceremonial wine and bread into the flesh and blood of Christ) inspired her. This is something she decades later, as a devoted atheist, has turned into

⁴ Like many other high school graduates Haraway went to a nearby college in Colorado, but unlike many other students she pursued a triple major in subjects that are quite distinct and often otherwise create different people with different interests, namely zoology, philosophy and English literature (Haraway in Thyrza Nichols Goodeve 2000:13). After graduation in 1966 she went to Paris for a year on a Fulbright scholarship at the Faculté des Sciences, Université de Paris. Her political interests, flowering during her years at Colorado College, and appreciation of socialist politics came to new depths in Paris, Marxist notions of struggles appealed to her feminist mind. Back in the USA she started her PhD in biology at Yale University and there she became immersed in the lively anti-racist and feminist campus politics of the day.

⁵ Her passion for (and perhaps also frustration with) biology, for figural realism and for unusual analysis or readings strategies, like reading the organism as poem, is a persistent feature in Haraway’s oeuvre.

the 'wordly practice' of studying symbolic entities that has a quite real existence and connection to hers and many other's everyday life. She brought this "figural realism" in her work as a scholar as an insistence on the worldly and material, and as an act of faith hoping to resist the separation of the material and the semiotic (Haraway 1997:11). Such separation, between nature and culture, or, the real and the meaning we give to it, define much conventional thought. That is why the cyborg in Haraway's version was a controversial example of her *figural realism*, a feminist science fiction figure much like herself forged in the heat of worlds at war. After all, as Haraway often notes, she is a child herself of the Cold War, Sputnik, and American post-world war II militarism as well as a privileged white daughter of the Vietnam War, of the student movements, the Civil Rights, Women's and Gay Rights Movements taking place in Europe and the USA in the late 1960's and later the battle between interdisciplinary scholars and defenders of 'science proper' in the 1990's so called science wars. No wonder the hyper-gendered warrior figure of the cyborg attracted her. [22.]

The cyborg was for Haraway more than a metaphor for the joint merging of biology and technology. It collected fractured identities and border zones of many kinds, like the bridging of the human body and other biological organisms, the virtual and the real (Haraway 1991). It was an imploded node of fact and fiction, nature and culture, embodied and embedded in the networks of technoscience. An implosion, in contrast to an explosion, concentrates matters. Haraway's cyborg was an implosion of entangled cultural meaning and materiality with socialist feminist urgency. She picked out some threads out of that over-determined, imploded figure and re-read the cyborg as a political myth, an ironic parable of processes already set in motion that not necessarily had to end badly. The cyborg had potentials. A metaphor for modern technoscience, cyborgs point to the collapsing of nature and culture into each other. She saw the same collapsing of the soft and hard sciences, making the cyborg a figure of interdisciplinary alliances. If dichotomous thinking about nature and culture, according to Haraway was impossible to uphold, then other feminist dichotomies like sex/gender would also be problematized along with the cyborg figure. In that sense the cyborg was a feminist challenge, a call for feminist dedication to biology both as high-tech science and material processes of the body. [23.]

In relation to previous feminist approaches to the body, the cyborg figure was not exclusively describing women's bodies. It was neither *sexually pure* nor innocent but irreverent and promiscuous. In relation to the cyborg as a feminist tool, she described it as "a girl" in an act

of subversive resistance, but thinking in relation to the biological complexities of sex, she described it as a “post-gender”, something she later retracted (Haraway in Lykke et al. 2004:321-332). For Haraway the cyborg was however never about visible technological appendices to a body. It was about how science and technology had become such an intricate part of how we live our lives, and how we give meaning to it. The cyborg was a way of getting around the romantic ideas about naturalness, and women’s supposedly given relationship to nature as defended by ecofeminists and other feminist communities at the time she wrote her ironic Manifesto (as moreover a postmodern paraphrase to both the futurist and the communist earlier manifestos). In the midst of president Reagan’s Star Wars, she controversially celebrated the naturecultures of the cyborg figure instead of the nature goddess as an accurate example of women’s real life experiences. Haraway famously ended the Manifesto with “I would rather be a cyborg than a goddess” which surely suggested a provocation to spiritual ecofeminism as much as call to engage with science and technology (Haraway 1991:181). However partly fictional and partly factual offspring of militarism, the cyborg was about getting real with *both* the unexpected promises (of undoing gender and other bipolar distinctions such as culture versus nature) and threats of technoscience (of extinguishing humans from the surface of the earth). “Cyborgs for earthly survival!” Haraway exclaimed. The cyborg described not so much individuals as whole ways of life, always a hybrid of natureculture. If the previous focus on women’s bodies risked *re-enforcing* the traditional symbolism woman/body/nature and man/mind/culture, the cyborg twisted things around and emphasised the already made connection of technology with women. Technology is thus not just hardware and metallic machinery, but literally whole ways of life (echoing both cultural theorist Theresa de Lauretis’ understanding of *technologies of gender* and Michel Foucault’s understanding of the *technologies of the self*). This has since had implications for all kinds of materialist cultural studies. [24.]

Cyborgs were for Haraway ironical distillations of complex naturecultures and potent alliances. A socialist feminist at core, she pointed to how women all over the world, working under extreme and poor conditions in exploitative industry settings (or rich enough to be subjecting themselves to body enhancing cosmetic surgery), was part of an integrated circuit of capitalist society, how women, otherwise seldom associated with technology, in effect were an intrinsic part of the machinery of society. We are all here implied, and in that sense Haraway contended that we are all cyborgs now. Feminists have no innocent or privileged, better knowing position in all of this. Fighting against racism, capitalism and sexism we are

all already structured into it, part of it. There is nothing pure or natural about how we all are cyborgs in once sense or another. However, it is here in this *cyborgian complicity* that Haraway signalled a resourceful way for changing research and society from within. The harawayan re-thinking of the cyborg was clearly not celebrating scientific innocence, but a critical tool for societal analysis taking both scholarship and science to the task. Thinking about the reality producing potential of such scientific visions as those of Clynes and Kline, Haraway took a leap and landed with one foot into the domain of biological science and one into the realm of science fiction futures in order to envision alternatives for sustainable survival of the many complicated, human or non-human inhabitants of the planet. [25.]

Like the cyborg, our present technoscience society has this both scary and promising doubleness to it. Thinking with such cyborg feminism, there is no use in demonizing science nor in simply celebrating it. Moving beyond thinking either-or, good and evil, we need to engage with the material, the organic and the biological in new imaginative ways. With a renewed feminist interest in the material and fleshy body, much pioneered by Donna Haraway's ontological figure of the cyborg, the many slippery meanings attached to "biology" as a term can be dissected. Biology can signify a field of science or the physical processes within or between bodies. Furthermore, it has been taken to signify a kind of nature of Nature, like a general dustbin for things out of human control (Birke 2000; Haraway 1989). Importantly, Haraway's cyborg signalled a crucial shift in the feminist attention to biology as "a political discourse, which we should engage at every level". Further, "biology is a source of intense intellectual, emotional, and physical pleasure. Nothing like that should be given up lightly – or approached only in a scolding or celebratory mode" (Haraway 2004: 203). "Biology" has had the tendency to mean the actual body itself, rather than a social discourse open to intervention (Haraway 1991:134). The cyborg approach was radically different, it meant going beyond simple critiques or celebrations to engage and intervene with material bodies and biologies from not only humanist perspectives but to "unpack" or "open up" clusters of material meaning in a much more complex and open-ended way. This means a feminist analysis where the end result is not given or known on beforehand. It means learning to live with uncertainties and ambiguities also in the very practice of writing. [26.]

Moreover, none of Donna Haraway's publications can easily be said to fit neither social constructivist nor naturalist takes on biology. While including biological knowledge, she shuns biological determinism and while including (loads of) cultural theory she rejects a pure

culturalist view on the body as merely a blank space for social inscription. She is not referring to pure nature, neither pure culture; for her it is always very specific constellations of naturecultures (Haraway 2003).⁶ Her work is a serious and interdisciplinary effort to move beyond assumed distinctions and deal with hybrids and borderzones. She has used very exacting figures, sometimes distinctly ironic types, like “the cyborg”, “the primate” or “the coyote”, to unravel a rich array of very local and empirically grounded stories about natures that turned out to be anything but given or passively natural.⁷ These figure have by Haraway been described as a co-constructed, entangled or “imploded knots” of *naturecultures*, of both fleshy materiality and discursive constructions of the humanist imagination (Haraway 1997:12; Haraway in Lykke et al 2000:57). [27.]

Post-cyborg feminisms: Ontology is politics by other means!

Haraway wrote the manifesto with a large dose of anger and frustration behind her use of an ironic style; the cyborg was a way of playing out the ambiguity between the literal and the figural, the specific facticity of our technosociety’s effects on our bodies and our selves. Her cyborg manifesto was sometimes hard to digest, also for her fellow 1980’s feminists. Her ironic approach, wide ranging and implied style of writing made also the Manifesto open for

⁶ Haraway’s notion of an inessential “nature of no nature”, is in direct dialogue with another feminist science studies scholar, Sharon Traweek who did ethnographic work among physicists (Haraway 1989). Traweek described how cultural factors like gender, nationality, race and even temperament, within the environment of physicists, constantly was understated and rendered invisible in laboratory practices and academic writing. In the name of neutrality, the scientists wanted to maintain their idea of living in a “culture of no culture” (Traweek 1988:162). This aspect of knowledge production within positivist science cultures (emphasizing neutral objectivity, cumulative and reproducible notions of knowledge and a sharp distinction between the knower and the known) has been conceptualized by Haraway as performing “the god trick” (1991:189). The god trick is the idea that science and researcher can see all as from nowhere, without self being seen. It is the problematic celebration of god-like neutrality, disembodiment and innocence, and further the belief that reality awaits discovery and description in a singular and univocal way. This detached, disembodied and disinterested position was problematized also by Haraway in the article “Situated knowledges”. Though related, Haraway’s cyborg manifesto can be read as her ontology and her “Situated knowledges” as her complementary epistemology.

⁷ The coyote, a “trickster” in Native American mythology, figures in her work to signify how non-human “nature” (for instance animals, insects, microbes or plants) is anything but stupid, soulless matter; it is performing as a kind of “witty agent” (Haraway 1991:199). Coyote-nature play tricks, reacts and can be said to harbour a non-human, and thus more difficult to understand, form of agency. This harawayan figure has bearing on the idea that science can once and for all empty out all the mysteries of nature, since coyote-nature will always be partially revealed with human tools and in the last instance of its non-human form dodge human description. But this is not to say that the natural sciences cannot provide valuable and correct knowledge. Further it is as far away as possible from denying the existence of reality or the physicality of embodiment. Biological forms of agency do not only affect, but are an intrinsic part of human lives. Genes, hormones as well as the millions of micro-biologies within and between us, in the form of for instance viruses and intestine bacteria, acts in certain complicated manners depending on the environments and other agencies involved. In Haraway’s words, the body in all its entanglement “is an agent, not a resource” (1991:200). The parable of the coyote functions to describe nature in non-essentialist terms and yet as a non-human actor; it is an agential and effective nature beyond the limits of human language, control and comprehension. Nature is not a blank space for social constructions, nor is it a mere essence for identities or an ahistorical resource for scientific discoveries.

several interpretations and misunderstandings. Critical questions were raised regarding the usability of the descriptive metaphor of the cyborg besides opening up a playful space for thinking beyond dualities. In popular culture cyborgs rarely challenge traditional gendered and racialized stereotypes, instead the cyborg gendering seemed excessively traditional with ultra-feminine fembots and super-masculine Terminators. Cyborg imagery is not so much post-gender, argued feminist cyborg scholar Anne Balsamo (2000), who pointed to how cyborgs also could reinsert us into traditional bourgeois notions of human individualism and discrete machinery. Also Haraway's oppositional treatment of the goddess and the cyborg provoked responses and new hybrids (cf. Lykke 2000). The cyborg manifesto spawned many reactions and new suggestions. Some felt on the one hand excluded by Haraway's writing style. That is regrettable given that an important theme of her work is the extent to which women are part of scientific discourse. Reconfiguring science and technology in mere writing, argued some, did not provide clear guidelines for how feminists could act to change them in political practice (cf. McNeil 2000: 230; Wajcman 2004: 95). On the other hand, new writing styles as innovative ways of thinking is needed since the old ones clearly is not doing the job. One cannot be comfortable, if one is to change our complex biotechnological world towards less "final solutions". More than mere critique of science, cyborgian thinking teaches us to endure the ambiguities we live and survive by, and to be accountable for our own complicity in complex power relations, but also to be imaginative and open for surprises in the face of ontological politics. In that tradition Haraway's cyborg also figures as an interdisciplinary challenge. Post-cyborg, writes Haraway, what counts as biological kind troubles previous categories of organism. The machinic and the textual are integral to the organic and vice versa in irreversible ways (Haraway 2003:15). In the "cyborg manifesto", Haraway provided a tentative trope, a literal figure for honouring the skills and practices of contemporary technoculture "without losing touch with the permanent war apparatus of non-optional, post-nuclear world and its transcendent, very material lies" (Haraway 2003:11). Importantly, the cyborg hardly exhausts all possible kinds of figural potential that can bring insight and change to our complex world. Haraway herself has shifted her attention to other figures such as that of "companion species" (co-dependencies between species that belies human exceptionalism) and through that prism engaged differently with human-dog relationships (implicating the collapse of the wild and the civilized, the internal and the external). Cyborgs are for her and other feminists now junior siblings in a much bigger, queer family of companion species, such as primates, coyotes and transgenic lab rats. However, as argued here throughout, the cyborg

was a really crucial key figure to the ontological issues that haunts feminist materialist thinking today. [28.]

Not the posthumanist end of Man, but the ignition of Posthumanities

The cyborg came to herald a crucial shift in the feminist modes of attention towards the body and biology as a scientific discipline. Conventionally, scientists should deal with real nature and scholars with culture. But feminists technoscience scholars like Haraway, messed things up a few decades ago – to the dismay of both traditional scientists and humanist puritans of disciplinarity. Thus, we inherited, not a blank slate of gender constructivist discourse from which to counter biologically reductive arguments, but a rich resource of cyborgian technoscience studies that has incurably informed the feminist imagination and from which we can turn (back) and revisit many issues of ontological politics. [29.]

Modern society is entangled in complicated issues of life and healing, death and suffering, of who gets to live, who gets to die and who decides that – and the feminist approach to the everyday life woman cyborg that Haraway proposed was a way of unpacking and holding up for inspection some intricate details that really effects all kinds of feminist politics and other democratic issues of science. The cyborg was a tool for thinking through such complex issues. With respect to the relationship between science, biological body and feminism, Haraway's cyborg manifesto must be read as a call to arms as much as a declaration of alliance. Most effectively, the cyborg has worked to describe interdisciplinary alliances and complex relations such as those between feminist theory, cultural studies and science and technology studies. Mapping out interdisciplinary connections across national borders, Nina Lykke (2002) has described her North European hybrid of feminist cultural studies of technoscience as *cyborg studies* (cf. Lykke & Åsberg 2010). As such, the cyborgian feminism of Haraway has proliferated way beyond the time and place of its dubious origins. In matters of ontology, it still provokes us to “go figure”. [30.]

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