Human/Machine Fusions and the Future of the Cyborg

Jasmine Erdener

Koç University, Turkey
jerdener@ku.edu.tr

Abstract

In 2019 the US Department of Defense (DOD) published a report describing cyborg soldiers equipped with powerful implants, to be deployed by 2050. The DOD's cyborg enables transhuman fantasies of controlling, augmenting, and weaponizing the body and the environment. The Cyborg Foundation, non-profit organization run by two artists, offers a different approach. These artists identify as cyborgs who aim to perceive the world differently, connect with nature, and expand normative human bodies and senses. In these human/machine fusions, and in cyborg theory, hybridity is an essential part of the cyborg's appeal. Hybridity, however, can also reinforce binary oppositions or provide the veneer of choice under the mantle of self-regulation and governmentality. Calculated illegibility might afford a different vantage point into cyborg politics, negotiating the sites at which the body is identified and known, and the possibility for opacity, sousveillance, or subversive misrecognition. The Cyborg Foundation offers a useful illustration of calculated illegibility, a way of performing cyborg identity and embodiment that runs counter to traditional cyborg narratives. This article engages a close reading of the DOD report and the Cyborg Foundation, and an interview I conducted with one of the organization's founders, Moon Ribas, to argue that illegibility better aligns with Donna Haraway's call for a cyborg politics that disrupts and recodes the hegemonic communication systems and militarized control over the body and the planet.

Keywords

cyborgs, hybridity, illegibility, disability, militarization, the body

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Introduction

In October 2019 the US Department of Defense (DOD) published a report titled *Cyborg Soldier 2050: Human/Machine Fusion and the Implications for the Future of the DOD* (Emanuel et al. 2019). The report was the culmination of a year-long study “to predict the direction cyborg technology will take within the next 30 years, determine how that could fundamentally impact national security, and make recommendations to senior DOD leadership on how to safeguard the United States and mitigate the threat posed by near-peer exploitation of these technologies” (Emanuel et al. 2019, 2). The DOD prediction that there will be intensive body-technology integration by 2050 leaves a relatively short time in which to grapple with questions of “human/machine fusion” and cyborg futures. Since the term was coined in 1960, a portmanteau of “cybernetic organism,” cyborgs have coiled their way through bodies, technology, militarism, and subversion.

The DOD report focuses on ocular and auditory enhancements, an implanted network of sensors to control a body’s muscular movement, and “direct neural enhancement of the human brain for two-way data transfer” (Emanuel et al. 2019, 2). The report often reads like a proposed sequel to the 1987 film *RoboCop*, which depicts the technologically transformed body of a police officer in a dystopian future, as the DOD Council intends to “go beyond augmentation” to “enhance performance through a range of modifications from the functional to the radically structural beyond the normal baseline for humans” (Emanuel et al. 2019, 1). As in *RoboCop*, the DOD argues that these technologies will offer greatest benefit to wounded and disabled veterans, using disability as the justification for cyborg research and weaponry.

For the DOD, the cyborg enables transhuman fantasies of controlling, augmenting, and weaponizing the body and the environment. They draw from both military research and science fiction to present the cyborg as the natural extension of human technological evolution. This vision of superhuman strength and abilities stems from a long history of cyborgs as technological interventions to make the human body and mind more powerful or to eliminate variation and disability in human bodies.

In contrast, the Cyborg Foundation, a non-profit created by two artists in 2010, offers a very different approach. Their website provides “an online platform for the research, development and promotion of projects related to the creation of new senses and perceptions by applying technology to the human body” (Cyborg Foundation 2020). Both founders identify as cyborgs and have had technology implanted into their bodies to alter their sensory perceptions. Neil Harbisson has an antenna attached to his brain that allows him to perceive a wide spectrum of visible light, as well as infrared and ultraviolet, by converting light waves into

sound. Moon Ribas implanted seismic sensors that allowed her to feel earthquakes happening anywhere on earth, or on the moon, although she has since had the sensors removed (Ribas 2019). Their implants serve no quantifiable function, nor are they intended to “fix” disability or grant superhuman powers. Their goal is to create new senses to perceive and understand the world differently, to connect with animals and nature, and to expand or explode the normative set of human bodies and senses.

The shape-shifting cyborg, from Donna Haraway’s 1985 insistence that “we are cyborgs” to high-level military forecasting, invokes technological-organic assemblages and ideological constructs. Retaining the cyborg as an analytic tool enables a kind of technological intersectionality, in which various subject positions and material rearrangements can be examined for how they enable, circumvent, reconfigure, or destroy political imperatives and power structures. As Lucy Suchman notes, “now that the cyborg figure has done its work of alerting us to the political effects, shifting boundaries, and transformative possibilities in human-machine mixings, it is time to get on with investigation of particular configurations and their consequences” (2007, 275–76). For both the DOD and the Cyborg Foundation, as for cybernetics and feminist theory, cyborgs hold the promise of revolutionary, and potentially dangerous, technological and bodily transformation.

Examining sites of cyborg entanglements, the ways in which bodies and machines intersect and are infused with both politics and possibility, brings the cyborg from theory to lived experience. Both the DOD and the Cyborg Foundation believe that technological transformations to the body will change what it means to be human. Each represents one element of what Haraway called a “cyborg world.” The DOD can be seen in line with “the final imposition of a grid of control on the planet, about the final abstraction embodied in a Star Wars apocalypse waged in the name of defense” (Haraway 1991, 154). But Haraway’s cyborg world also encompassed the “lived social and bodily realities in which people are not afraid of their joint kinship with animals and machines, not afraid of permanently partial identities and contradictory standpoints. The political struggle is to see from both perspectives at once because each reveals both dominations and possibilities unimaginable from the other vantage point” (1991, 154). The cyborg’s volatile hybridity is often cited as the radical and unpredictable edge of this political struggle, orienting the cyborg either towards the grid of control or against its military origins, and reimagining or dismantling restrictive binaries and subverting hegemonic control.

But while the cyborg’s hybridity is an essential part of its appeal, uncritical adoption of hybridity can paradoxically serve to reinforce binary oppositions or to provide the veneer of choice under the mantle of self-regulation and governmentality. Instead, calculated illegibility might afford a different vantage

point into cyborg politics, negotiating the sites at which the body is identified and known, and the possibility for intentional opacity, sousveillance, or subversive misrecognition. The Cyborg Foundation can provide a useful illustration of this calculated illegibility, a way of performing cyborg identity and embodiment that runs starkly counter to traditional cyborg narratives. This article engages a close reading of the DOD report and the Cyborg Foundation, and an interview I conducted with Moon Ribas, to argue that illegibility better aligns with Haraway's call for a cyborg politics that disrupts and recodes the hegemonic communication systems and militarized control over the body and the planet.

Situating the Cyborg

Haraway's explosive "Cyborg Manifesto" shaped many of the subsequent debates on the intersections between human and machine. The cyborg relies on the hybridity between binaries, at its core blending organic and machine, as well as nature/culture, human/animal, or physical/non-physical. The technoscientific politics of hybridity also align with postcolonial critiques of authoritarian power. Homi Bhabha, drawing from Bakhtin, focused on hybridity as "the moment in which the discourse of colonial authority loses its univocal grip on meaning and finds itself open to the trace of the language of the other" (Young 1995, 21). In postcolonial critique, hybridity fractures the monolithic categories of racial purity and colonial unity, as the "mongrel, half-caste, mixed race, *métis*, *mestizo* was a taboo figure in the colonial world. When so much pathos was invested in boundaries, boundary crossing involved dangerous liaisons" (Pieterse 2001, 226). As a chaotic agent of "transgressed boundaries, potent fusions and dangerous possibilities," Haraway's cyborg likewise offers the possibility of forging new connections and finding sites of resistance or subversion outside of existing power circuits (1991, 154).

Technological hybridity also calls to mind C. Riley Snorton's analysis of *Triton*, Samuel Delany's "curious work of fiction" that wrestles with the body as a heterotopia. Snorton describes Foucault's heterotopia as "the juxtaposition of several spaces in one place and the relationships of those spaces to time...and meaning" (Snorton 2016, 83). Delany used this idea to write of a bodily heterotopia: "The removal of one part or organ from the body and affixing it at another place in or on the body...A skin graft is a heterotopia. But so is a sex change" (Snorton 2016, 83). In Delany's novel, people can easily alter their bodies, and there are dozens of avenues for gender, racial, or sexual identification. The shifting organic geographies offer new possibilities to reshape traditional understandings of the body, social scripts, or identity. It also hints at the cyborg's hybridity, an idea reflected in the Cyborg Foundation's hope that the body might one day become a site of unparalleled change, uncoupled from social constraints.

But Snorton finds a warning in Foucault's and Delany's work on the heterotopia, and by extension the cyborg:

The quantification and categorization of gender and sexuality on Triton already heralds the proliferation of gendered possibilities as not displacing but regimenting and sedimenting gender (norms). On Triton, characters also exercise other forms of “control” over their bodies, electing to desire particular types of people and undergoing rejuvenating procedures to guard against any effects of aging. In other words, Triton’s government—referred to as the “computer hegemony”—provides self-regulation under a veneer of freedom through choice. Its dispensation toward radical libertarianism is intimately linked with the onset of an intergalactic war to maintain the possibility of multiple ways of life. (Snorton 2016, 85)

Hybridity is thus not the uncomplicated good that it might appear, as it may be appropriated and employed by “biopolitical and necropolitical modes of governance” (Snorton 2016, 92). In this context, the array of choices and the seemingly liberatory expansion of gender, sex, and race conceal the workings of neoliberal self-discipline by cultivating docile bodies, those which “may be subjected, used, transformed and improved” (Foucault 1995, 136). If docility is “less about obedience and more about the malleability of bodies and their ability to be trained into acquiescence” (Kraidy 2016, 115), then the heterotopia of Triton capitalizes on docile bodies in order to shape them to a new disciplinary model and self-regulatory ideal, while the fundamental workings of power remain unchanged. *Triton* demonstrates how hybridity can become a tool of hegemony, allowing benign forms of differentiation and experimentation that do not fundamentally challenge the status quo (Kraidy 2005; Acheraïou 2011). Untethered from specific political configurations or commitments, hybridity is not inherently liberatory. After all, the DOD is also creating a hybrid entity through human/machine fusions, and the Cyborg Foundation’s emphasis on individual freedom and choice can allow a smooth transition to the militarization and rigid bodily hierarchies of the DOD.

If hybridity may not offer the critical or subversive edge it once appeared to possess, perhaps Haraway’s “Cyborg Manifesto,” in conjunction with disability theory, queer theory, and Indigenous studies, can offer a different reading of cyborg politics. Echoing the univocal authority of earlier postcolonial critique, Haraway writes that cyborg politics must “struggle against perfect communication, against the one code that translates all meaning perfectly” (1991, 177). Haraway argues that cyborg politics must disrupt and “recode” the hegemonic and surveillant tendencies of communication systems and militarized command-control centers. In the struggle against perfect communication, perhaps the political potential of cyborg can be explored instead through calculated illegibility.

Variations of this concept animate theories of power and marginalization, but I argue illegibility has been eclipsed by hybridity in theorizing the cyborg, and offers a different political intervention. Opacity or illegibility can pose significant risk to individuals and communities, but can also produce creative forms of counter conduct, dissent, and collectivity (Lingel 2020). Deciding when and how to become visible or legible suggests an alternative approach to political intervention; as Peggy Phelan notes, “There is an important difference between willfully failing to appear and never being summoned” (1993, 11).

Queer theorists and disability studies scholars have wrestled with the cost of legibility and neoliberal regimes of recognition that “securitize and even militarize bodies and borders while touting the proliferation of diverse subjects of recognition as liberal progress and advancement” (Eng and Puar 2020, 2). The question of visibility and illegibility in queer theory must balance risk and reward, in the danger of been seen and the importance of finding one another. Scholars have documented this balancing act through the creation of a queer *alternativ* space, “a liminal site of rejection, alteration” (Shirinian 2018, 2), as well as strategies of “in/visibility,” where “accommodation and resistance are intertwined in complex ways” (Stella 2012, 1829). Linking surveillance studies with queer theory, Jessa Lingel draws from Simone Browne’s work on “dark sousveillance” to consider “dazzle camouflage” as a form of queer counter conduct, “to invite attention in a way that disrupts recognition” (Browne 2015; Lingel 2020, 4). Dazzle camouflage originated in military defense strategies from the First World War. Rather than attempting to disguise or conceal military craft, Allied forces painted ships with contrasting black and white lines (a Cubist collision with state-craft). German warships were able to see these dazzling ships but were unable to determine more detailed or precise information about their direction or movements. Although technologies and tactics have changed since then, “dazzle camouflage remains an instructive approach to managing an enemy’s watchful gaze” (Lingel 2020, 3).

The tension between visibility and illegibility also fits with Tobin Siebers’s description of disability as masquerade, in which individuals may “disguise one kind of disability with another or display their disability by exaggerating it” (2004, 4). Siebers argues that this practice “clouds the legibility of passing” and “serve[s] as small conspiracies against oppression and inequality. They subvert existing social conventions, and they contribute to the solidarity of marginal groups by seizing control of stereotypes and resisting the pressure to embrace norms of behavior and appearance” (Siebers 2004, 19; see also Evans 2017). Similarly, Indigenous studies scholars have debated the politics of liberal recognition as the site where colonial power is created and enacted (Coulthard 2014; Byrd 2020). Theorist Édouard Glissant explored opacity as a path to solidarity; drawing from Glissant, scholar and artist Zach Blas suggests “informatic opacity” as a means of

living “with technologies that express the joy of opacity, not its destruction” (Blas 2018, 198–99; Glissant 1997).

It is here that the Cyborg Foundation can offer an interesting, if imperfect, version of cyborg illegibility. As the DOD pursues fantasies of omniscience and invincibility through the union of communication and control, the Cyborg Foundation thwarts easy identification or categorization. Their work plays with visibility and illegibility, as they cultivate media attention yet emphasize cyborg implants that serve no recognizably productive purpose. Their implants create expressive and affective forms of communication, the antithesis of cybernetic feedback loops, and they circumvent typical narratives of cyborg disability.

Cyborgs are often represented as people whose disability is technologically erased, through “the devices’ ability to normalize the body and/or to restore its previous function” (Kafer 2013, 108). Alison Kafer points to the presumptively transformative power of hybridity to demonstrate how both Haraway’s “Cyborg Manifesto” and the cyborg in popular culture problematically represent people with disabilities as the quintessential cyborgs. Because cyborgs are often understood as technologies intersecting with an organic body, and because this is primarily seen as benefiting people with disabilities, “‘cyborg’ and ‘physically disabled person’ are seen as synonymous. Or, rather, that ‘person with physical disabilities’ is a self-evident, commonsense category of cyborgism” (Kafer 2013, 107).

Haraway’s manifesto also suggests that people with disabilities are cyborgs, as they are intimately familiar with the experience of living with and without machines. Yet “A Cyborg Manifesto” does not engage the experiences of disabled people (Kafer 2013, 105; Siebers 2008, 63; Weise 2018). The DOD report cites Haraway, “recognizing that someone with a cardiac pacemaker or implantable cardioverter-defibrillator would be considered a cyborg” (Emanuel et al. 2019, 1), but shows limited awareness of the lived experiences of disability or prosthetics, of how “this feeling of trial-and-error, repetition and glitch, is part of the cyborg condition and, by extension, the disabled condition” (Weise 2018). At the same time, the DOD declares that “our use of the term cyborg is intended to envision a grander and fundamentally more complex future involving human/machine technologies over the next 30 years” (Emanuel et al. 2019, 1), and projects a future where technology and bodies harmoniously intertwine to create a more powerful whole, where glitches or malfunctions are rare, and legal and ethical questions are secondary. The cyborg is thus paradoxically made to signify both currently disabled people and the eventual eradication of disability.

The DOD, like the fictional government of Triton, promises a future of technological body transformation and rejuvenation in order to cultivate docile bodies, and subsequently mobilize those bodies to war. The state relies on the

spectacular cyclical performance of injury and restoration to cement public support for war, “making warfare more efficient and, paradoxically, life-affirming. Damaged bodies, if successfully rebuilt, would recast war as a source of vitality rather than of death and destruction” (Terry 2017, 91). In a loop of Escherian logic, war creates disabled bodies, which the DOD uses as the justification for further military research and development, which leads once again to war. In this process, hybridity signals the transcendence of disability and becomes the means for future debility, through warfare and the cyborg soldier. Technological hybridity is weaponized as a tool of “ablenationalism...as a basis for promoting American exceptionalism abroad” (Mitchell and Snyder 2015, 35–36), and is connected to long-standing fantasies of making bodies transparent, identifiable, and malleable.

The Cyborg Warfighter

The cyborg first appeared in the context of cybernetic research and space exploration, as researchers Manfred Clynes and Nathan Kline (1960) hypothesized about the possibility of “solving the many technological problems” of space travel by transforming the human body itself (76). Integrating technology with the body would not only offer the possibility of exploring environments unsuited to human physiology, but would automate these biological processes, leaving humans “free to explore, to create, to think, and to feel” (Clynes and Kline 1960, 27). This early cyborg grew out of the military-funded research, primarily cybernetics, that took place during and after the First and Second World Wars. Paired with wartime research and defense, cybernetics began to articulate a vision of communication and control that saturated Western society. Cybernetics and the “inaugural moment of the computer age” shaped not only scientific research but also a “culturally specific imaginary” around communication and technology (Hayles 1999, xi).

The militaristic origins of cybernetic theory, and the ideology of communication and control, may not determine their later use and development; as Haraway (1991) writes of cyborgs, “they are the illegitimate offspring of militarism and patriarchal capitalism...But illegitimate offspring are often exceedingly unfaithful to their origins” (151). Ronald Kline (2009) critiques “flatten[ing] the history of cybernetics” to a single narrative originating in World War II and stretching through the present moment (333). However, he also argues that cybernetic ideas, methods, and metaphors pervade contemporary disciplines and cultural meanings: “They inform how we talk, think, and act on our digital present and future, from the utopian visions invoked by the terms *information age* and *cyberspace* to the dystopian visions associated with enemy *cyborgs* and *cyber warfare*. The traces of cybernetics and information theory thus permeate the sciences, technology, and culture of our daily lives” (R. Kline 2015, 4).

Nearly sixty years after Clynes and Kline envisioned cyborgs as a means of immersing humans in dangerous terrain, the DOD’s *Cyborg Soldier 2050* report

anticipates cyborgs operating in the battlefields of the future, “dense, urban environments or subterranean megacities that will challenge identification and tracking of targets” (Emanuel et al. 2019, 4). Cyborg soldiers might respond to threats against national security, conduct special operations, espionage, or surveillance, but the report does not offer greater details, or suggest limitations, on where or how cyborg soldiers might be deployed.

The DOD’s cyborg warfighter (a soldier in combat) will be uniquely equipped to function in various environments. The report identifies four areas as “being technically feasible by 2050 or earlier,” and among the highest priorities for national security, intelligence, and the battlefield (Emanuel et al. 2019, v). Cyborg soldiers could have ocular enhancements allowing them to perceive light outside the currently visible spectrum, analyze images and identify targets, and process and share data with individuals or military systems (Emanuel et al. 2019, 3–4). They might be outfitted with an “optogenetic bodysuit sensor web,” a network of electromagnetic sensors implanted throughout the body for muscular control (Emanuel et al. 2019, v). Initially, this technology might permit the “restoration of lost function” to injured muscles or limbs, but could eventually allow individuals to perform tasks at “the limits of their physical capability,” and even allow an external person or system to take control, or puppet, their body (Emanuel et al. 2019, 5). Warfighters might have auditory implants to expand the range of acoustic perception and allow “imagined or covert speech” to communicate with others through “neural signaling,” which the report also recommends for intelligence and police officers (Emanuel et al. 2019, 7). Finally, the report describes “direct neural enhancement of the brain” that would interface between individuals, as well as between an individual and machine: “drones, weapon systems, and other remote systems” (Emanuel et al. 2019, 7).

The report does acknowledge and question the feasibility and ethics of military cyborgs, such as the risks of hacking, surveillance, and malfunctioning technology (or individuals), whether and how to integrate augmented individuals with non-augmented troops, whether “a service member [could] be compelled to undergo an enhancement” (Emanuel et al. 2019, 17–21) or have an enhancement involuntarily removed. They observe that there are significant issues that current legal frameworks are unable to address, such as whether an augmented individual might track or surveil civilians (outside of US government directives); if cyborgs must disclose their capabilities in civilian settings; whether they could travel abroad with sensitive or proprietary technology; if they would be required to return or decommission implanted technologies, and the potential physical and psychological effects of doing so. Expert contributors to the report “unanimously anticipated” that US adversaries would see the use of military cyborgs as an opportunity “to undermine U.S. interests and stigmatize the DOD as unethical” (Emanuel et al. 2019, 11). They note that mass media is “a known stage for demonization of cyborgs” and broadly recommend that the DOD invest in media,

film, and literature to positively influence public perception of these technologies (Emanuel et al. 2019, 11).

The DOD implies that militarized cyborgs will pervade every aspect of life, with cyborg individuals tracking, surveilling, recording, or terrorizing individuals and populations, as well as generating and accumulating vast stores of sensitive or classified data. Cyborg soldiers signal the penetrating gaze of the state upon the individual as well as on the public, by making legible all forms of bodies and beliefs. In this, “taking legibility into account can help to explain not only a quantitative increase in the state’s extractive capacity but also a qualitative shift in the arsenal of extractive instruments at the state’s disposal” (Lee and Zhang 2017, 129). The report recognizes the legal and ethical concerns, but ultimately concludes that “the benefits afforded by human/machine fusions will be significant and will have a positive impact on humans through the restoration of functionality lost due to illness or injury,” as well as benefiting the “defense community...military operations and training” (Emanuel et al. 2019, 22). The authors anticipate that “the gradual introduction of beneficial restorative cyborg technologies will, to an extent, acclimatize the population to their use” and “will work to mitigate the misuse or unintended consequences of these technologies” (Emanuel et al. 2019, v, vii). Of course, these technologies are envisioned for a select few, including US veterans and perhaps eventually some US citizens, but rarely for people injured by US military operations in other countries.

The DOD is aware that the powerful invocation of bodies, injured and technologically restored in the service of the nation, can shield the DOD from what they blandly phrase as the potential “misuse or unintended consequences” of cyborg war technologies. As Jennifer Terry (2017) writes, “Technoscientific fantasies of miraculous healing and of ‘humane’ war-fighting entangle violence with dreams of surpassing bodily limitations and of performing antiseptic death” (3). The report builds on ableist and transhuman precedents to suggest disabled bodies as the initial site or forefront for cyborg technologies, perhaps eventually eradicating disability entirely; these presumptively curative technologies are the direct justification for pursuing a heavily militarized cyborg. The ocular enhancement, optogenetic bodysuit, and auditory implants are considered first for individuals who have damaged tissue or lost body function, as it is “deemed unlikely that individuals would willingly undergo removal of healthy tissue,” and the “current level of invasiveness” for the proposed procedures render them irreversible (Emanuel et al. 2019, 4–6). But the report also seems to acknowledge that cyborg technologies could create new categories of ability and disability, as “enhanced” individuals possess capabilities beyond those of unmodified individuals, and removing (or amputating) cyborg technology could have significant physical, psychological, or social repercussions (Emanuel et al. 2019, 19).

This cyborg targets Cartesian dualism to allow the mind (or, eventually, an AI system) ultimate control over an unruly or disobedient corporeality, seeking “to acquire maximum, if not total, intelligence, while at the same time escaping the imperfections of the human body through the coding of human bodies as problems in need of solutions” (Masters 2005, 114). The DOD cannot conceive of the cyborg as anything other than a war assemblage for geopolitical supremacy, and plans to use cyborg technologies to decode, augment, and control the body, as a means of creating extra-ordinary or superhuman capabilities.

The Cyborg Foundation

In contrast, the Cyborg Foundation situates itself at the intersection of art, technology, and social change, advocating technological interventions to transform and expand individual sensory perception. The two founders, Neil Harbisson and Moon Ribas, follow early self-identified cyborgs such as Steve Mann, Kevin Warwick, and performance artist Stelarc. I interviewed Moon Ribas over Skype in December 2019 to ask about her work and that of the Cyborg Foundation. Both Harbisson and Ribas have also given numerous talks, performances, and media interviews.

The Cyborg Foundation draws from elements of posthuman and transhuman discourses and sees the cyborg as constantly changing. Transhumanism and posthumanism tread conceptually contested ground. Briefly, transhumanism often takes a linear evolutionary approach to technology, and “envision[s] the possibility of broadening human potential by overcoming aging, cognitive shortcomings, involuntary suffering, and our confinement to planet Earth” (Bostrom 2005, 26), in line with the DOD’s interpretation of cyborg technologies. Posthumanism often focuses instead on “a reconceptualization of culture, technology, and history, as well as human beings, from a non-anthropocentric perspective” (Rutsky 2007, 108), an approach sometimes referred to as critical posthumanism.

Harbisson and Ribas are part of a Catalan avant-garde art movement. Both identify as cyborgs and have had extrasensory technologies implanted into their bodies. Ribas has experimented with novel sensory perceptions by implanting a device that vibrates in tandem with earthquakes on Earth or the moon, putting her in touch with the frequent rumblings of the planet’s deep interior. Harbisson argues he is one of the first legally recognized cyborgs, as his cranially implanted antenna was eventually accepted as a permanent body part (rather than an external device) by the UK government for his passport photo (Bryant 2013). Harbisson has achromatopsia, a type of colorblindness in which he cannot perceive colors, and instead sees black, white, and shades of grey. The camera-antenna implant transforms the spectrum of light, including infrared and ultraviolet light, into sonic vibrations, effectively allowing him to hear color. He does not use the antenna to “fix” his vision, but to understand color in a new and

different way, by creating a synesthetic sense. As he explains, “My aim was never to overcome anything. Seeing in greyscale has many advantages. I have better night vision. I memorize shapes more readily, and I’m not easily fooled by camouflages. And black-and-white photocopies are cheaper. I didn’t feel there was a physical problem, and I never wanted to change my sight. I wanted to create a new organ for seeing” (Donahue 2017).

Harbisson addresses the complex relationship between disability and the cyborg by dismissing the idea that his antenna “corrects” his colorblindness, or that people with disabilities will especially benefit from becoming cyborgs. Harbisson does not consider himself a cyborg because his antenna approximates an able-bodied experience (perceiving color), but because he has fundamentally reframed the experience of being human. Ribas also described the cyborg as a personal identity; in our interview, she said that there are many ways to connect with technology, but the most important is whether an individual feels that they are a cyborg.

The Cyborg Foundation hopes to expand the possible range of bodies and senses, subverting technological ideologies of progress, power, and control, and destabilizing normative categorizations of human and nonhuman. Harbisson argues that “if you define yourself as transspecies, everything is ‘normal’: seeing in black and white, being blind, or perceiving colours through an antenna. It all becomes part of normality” (Pristauz, n.d.). While the Cyborg Foundation has used the term “transhuman” in the past, they primarily identify as “transspecies” now, as they feel that transhumanism contains an “inherent hierarchy, a kind of superiority” of humans over other species (Pristauz, n.d.). The link with animal abilities reflects what Cary Wolfe calls the intersection between “animal studies and disability studies...in what has recently emerged as a small subfield of its own: authors who claim that their condition has enabled for them a unique understanding of nonhuman animals and how they experience the world” (2010, 128). Wolfe cites Monty Roberts, “the famed ‘horse whisperer,’” who had the same form of colorblindness as Harbisson, and used that ability to “read the body language of horses with amazing subtlety and precision” (Wolfe 2010, 128). The connection between animal studies and disability studies offers the promise of cross-species connection and insight, but as with Snorton’s critique of hybridity and heterotopia, Wolfe cautions against reinscribing the hierarchies and limitations of liberal humanism.

Harbisson and Ribas emphasize that their technological adjustments offer a greater sense of connection and communion with nature and the environment. Harbisson feels that his antenna aligns him with insects, and that the ability to perceive a broader spectrum of light (infrared and ultraviolet) makes him “much more connected to the species that sense these colors. Because, we now share a sense...Not with machines. I think, many people think that becoming a cyborg

brings me closer to a machine, but I feel like it makes me much closer to nature and to other animal species” (Olonan 2017). When we spoke, Ribas underscored that their technological modifications are not about becoming superhuman but are intended to foster different understandings of nature and the planet, and to “create more empathy” with the natural world. Harbisson and Ribas are critical of anthropocentric ideas based on “humans as the center of the world,” and they “want to remind people that we are not alone in this world, there are many living things, even if you don’t see that they are moving, they are alive. We are not the only living creatures on this earth, even the earth itself moves and evolves and is alive” (Ribas 2019).

In contrast to cybernetics and “the translation of the world into a problem of coding” (Haraway 1991, 164), the Cyborg Foundation uses quantitative technologies in the service of art, by creating individual experiences and sensations that can only be shared or understood expressively. Harbisson’s and Ribas’s sensors offer no clear utility, subverting the assumption that implants and prosthetics contribute to constructing a cybernetic superhuman. They are not interested in artificial intelligence but in what they term “artificial senses...where the stimuli is gathered by the technology but the intelligence is created by the human” (Cyborg Foundation 2020). The technological apparatus of Harbisson’s antenna-organ functions through a computer chip, Bluetooth, and a camera, but its internal logic is a light-to-sound scale of Harbisson’s own devising, and he is the sole recipient of the output. In interviews and public events, curious reporters regularly ask Harbisson and Ribas what it is like to be a cyborg, to hear color or to feel the internal movement of the earth. Harbisson and Ribas often work to translate the affective experience of their modifications for others, but it is necessarily mediated through yet another form of visual or sonic expression. Harbisson has created musical compositions based on the colors in a person’s face and transformed popular songs into cascades of color, while Ribas interprets earthquakes through dance and performance art.

The Cyborg Foundation operates in a muddy space adjacent to the logics of investment and capitalism, neither fully outside of technological production nor functionally legible within it. When I asked how they see their work in relation to business ventures and capitalism, Ribas expressed deep misgivings about capitalism and technology, and said that although they have given talks and workshops at tech and business conferences, they rarely feel that they belong in those spaces. She said that they are often asked if cyborg technology will create dangerous divisions between rich and poor, but she did not think that critique applied to their version of the cyborg, and that it was of greater concern in the normative or militarized version of the cyborg, in which some individuals might become quite powerful while others are left vulnerable. Ribas cited collective and grassroots efforts to build technologies, noting that the people who join the Cyborg Foundation are “more like teenagers that know how to hack, and they can

build things themselves” (Ribas 2019). The Cyborg Foundation is built around the aesthetic of an underground, DIY (“do it yourself”), artist collective pursuing cyborg modifications, both developing ideas and prototypes, and even for the surgeries themselves. Most medical institutions refuse to perform the procedures, and invasive elective implants are not covered by insurance, meaning they must find doctors (or others) willing to perform the surgeries, usually anonymously, and find means to fund the supplies, procedures, and recovery. The Cyborg Foundation occupies a privileged sphere in which they can create and implant potentially risky devices, sometimes traveling outside of Spain or Europe to do so, as well as radically disrupting social norms without fear of retribution.

Ultimately, the Cyborg Foundation may be understood through the lens of “both/and,” both advocating a possible alternative for cyborg futures and fostering uneasy connections with capitalist tech and business circles that might easily reincorporate their technologies or message. Their work concretizes certain elements of the cyborg’s often ambiguous politics and draws from posthumanism to resituate humans as part of the larger natural world. But by trying to dismantle normative categorizations of the body, and by blurring the line between visibility and illegibility, they offer a creative example of the cyborg’s “potent fusions” apart from that of the DOD.

Conclusion: Performing Cyborg Futures

The Cyborg Foundation and the DOD are both performing and contesting the cyborg, as well as struggling over public perception and approval for the future of cyborg technologies. The Cyborg Foundation’s work can be interpreted in its totality as a performance art piece, in which the research, design, implementation, and public presentation of technological devices is an ongoing performance of cyborg identity, one that the artists hope others will pursue as well. Performance, and perhaps provocation, may be their primary intention; Harbisson’s cranial antenna is immediately notable, and although the earthquakes sensors Ribas implanted were not outwardly visible, she performed the experience of earthquakes on stage. As Lingel writes, “Dazzle camouflage is performative, disrupting expectations of bodily arrangements in order to conceal one’s intentions or movements” (2020, 4). The Cyborg Foundation negotiates boundaries of visibility and illegibility, performance and obfuscation. Harbisson pushed for his cranial antennae to be recognized by the UK government as a permanent body part, but the Cyborg Foundation also skirts governmental (and medical) oversight.

The element of the Cyborg Foundation that confuses, rejects, or circumvents conventional cyborg narratives and imagery might be understood as an intervention in calculated illegibility, in choosing when and how to make their work both visible and legible. It is this space of confusion or illegibility that J. Bobby Noble suggests (in relation to trans embodiment) could create “surprise

encounters” that destabilize “supposedly naturalized bodies as socially-produced and socially-reinforced imperatives” (2007, 174). Noble argues that this could become “not only one of the sites where this struggle for and against hegemony occurs; but it becomes also the stake to be won or lost in those battles” (2007, 175). The Cyborg Foundation is undoubtedly privileged in its ability to bend social norms and expectations in this way. Yet one might also argue that just as these artists follow in the footsteps of earlier cyborgs, the Cyborg Foundation could shape a generation of cyborg modifications that intentionally do not *fit*, and which play with the boundaries between visibility and illegibility.

At the same time, performance-based collectives require performative acts in order to sustain public interest and, potentially, attract funding. Although the Cyborg Foundation operates in an avant-garde art scene, there is no reason to believe that cyborg technologies will remain there. Wealthy individuals, corporations, or the DOD itself might easily co-opt these cyborg technologies in the future, perhaps even as a direct result of the Cyborg Foundation’s work in changing public perception or developing early technologies. The DOD report recommends investing in media to positively influence public perception of cyborg technologies, but they may also appropriate the performative public work of a group like the Cyborg Foundation.

The DOD’s *Cyborg Soldier 2050* is also a work of speculative media and propaganda, a political vision board for techno-military dominance. As a publicly released document, rather than a classified internal memo, the report outlines what the DOD would like to achieve in the next thirty years, as well as what they would like allies and rivals to *believe* they will achieve. There are no glitches, no technological or organic challenges that cannot be problematized and overcome through a matter of upgrades or coding. The DOD embraces a transhuman perspective of linear evolution through increasingly powerful technological interventions, understanding the body as a docile tool towards that goal. The DOD positions the human (and, more specifically, the US warfighter) as a superior being who dominates the natural world and seeks uncompromising dominance over geopolitical rivals. Other governments are also turning their gaze to human/machine fusions; in December 2020, the French government published their own report on ethical guidelines for augmented soldiers, stating that they do not have immediate plans to develop augmented soldiers, but that they are preparing for the future (Guy 2020). Identifying alternatives to the militarized cyborg, or the underground exclusivity of the Cyborg Foundation, seems a fraught but urgent problem; otherwise the matrix of domination is technologically updated, placing “certain humans into a highly sophisticated cyborglike transhumanist existence, while leaving the unaccounted-for ‘other’ behind in their current human form, or worse” (Butler 2018, 107; Collins 2009, 18).

The DOD and the Cyborg Foundation are cautionary examples against the easy promise of transformative hybridity, since a multitude of bodies or senses do not guard against overarching disciplinary power or pervasive self-regulation. When I asked about her earthquake sensors, Ribas said that she felt much more apprehensive having them removed than implanted, in terms of her own identity as a cyborg, for possible negative reactions or censure from her social circle, and for whether the world she had built over the past several years would fade along with the sensation of earthquakes. In a collective of cyborg experimentation, to be without a technological modification could suddenly put her out of place, suggesting that the pressure of conformity, even to nonconformity, is still at play.

With the grim prospect of immense military investment in augmented soldiers, and limited ethical oversight, a project like the Cyborg Foundation may not be able to offer much. The aspirational and egalitarian rhetoric, and even the technologies themselves, might be easily co-opted by the DOD, or by the venture capitalist tech circles of liberal self-improvement with whom the Cyborg Foundation uncomfortably overlaps. But so too do they offer a small sliver of possibility, that this imperfect cyborg could begin to align with the call for a cyborg politics, for building critical coalitions, alliances, or surprise encounters amidst experiences and sensations that are untranslatable and incommunicable (a synesthetic antenna, a bodily earthquake). As states weaponize, surveil, and control bodies from the inside out, collectives like the Cyborg Foundation might find new methods for calculated illegibility or informatic opacity, to introduce static into hegemonic communication systems, or recode the militarized control over the body and the planet.

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Author Bio

Jasmine Erdener is an assistant professor in the Media and Visual Arts Department at Koç University in Istanbul, Turkey.