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CYBORG-TECHNOLOGY RELATIONS

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Abstract

We advocate for a philosophizing of cyborg-technology relations that takes account of disabled technology users. First, we sketch out how tech-driven ableism ("technoableism") is present in most discourse about technology, and then address how ableism has shaped accounts of disability in philosophy more broadly too. We examine this in historical and media context, then turn to what an unapologetic disability-forward approach to cyborg-technology relations looks like, and what it means to listen to the cyborgs we know and love. This work draws from the interdisciplinary field of disability studies and STS work on crip technoscience. We situate this work mostly within North American media and history of disability and Silicon Valley boosterism on tech, but accounts of technology and of disability are not unique to these locations.

1 INTRODUCTION

In this piece, we offer a philosophy of Cyborg-Technology relations. We do so by grounding the being of a cyborg both within the lived experience of actual cyborgs — i.e., technologized disabled people — as well as the historical and contemporary contexts from which the idea (and being) emerged. Our account of cyborg-technology relations pulls from phenomenology, postphenomenology, agential realism, feminist Science and Technology Studies (STS), and ethics of care. We argue that the images of cyborgs we receive from engineers, futurists, media, and capitalist utopias fail to encompass the whole of being a cyborg, and that only cyborgs themselves can adequately describe the being of a cyborg. We argue that there is no singular experience of being a cyborg; that each unique situation produces multiple ontologies of cyborg-ness. Furthermore, we argue that cyborgs must be involved in the production of the technologies they are in intimate intra-dependence with. This work draws from the interdisciplinary field of disability studies and STS work on crip technoscience. We situate this work mostly within North American media and history of disability and Silicon Valley boosterism of tech, but accounts of technology and of disability are not unique to these locations. We are also situated differently in our own bodyminds to this topic. The authors include a disabled cyborg, and a nondisabled non-cyborg (takes no medications, doesn't even wear glasses). To that end, we try to make sure that descriptions of experience as disabled people are done either by our disabled author, or via the writings of other disabled people.

As with any good philosophy paper, we must begin with a set of definitions. Foremost among them is the term "cyborg," coined by Manfred Clynes and Nathan S. Kline in their 1960 paper in *Astronautics*, Cyborgs and Space. They used "cyborg" (a portmanteau of the words "cybernetic" and "organism") to describe the kinds of technological alterations people would need in order to survive for long periods in space. They envisioned hormonal and chemical alterations via pills and supplements more than robotic or mechanical replacements of organs or limbs (Clynes & Kline, 1960). Kline, relatedly, developed the very first drugs for the treatment of psychological disorders. Following this, we include people who use medications to manage conditions like ADHD, depression, schizophrenia, autism, and other neurodivergent conditions in the definition of cyborg. We also consider in our definition of cyborg disabled people who use technologies like pacemakers, joint replacements, cochlear implants and hearing aids, walkers and rollators, wheelchairs, crutches, ostomy bags, orthotics and prosthetics, and other types of tech in their daily lives. We go beyond the narrow definition of Clynes and Kline, though not so far as to say that all people who use (or even rely on) technology are cyborgs.

Some authors do go this far, arguing that humans have always been cyborgs (Clark, 2009). They argue that the creation and reliance upon technology is a fundamental feature of the human being and, as such, even things like clothing, housing, water collection and distribution, and agriculture are all cyborg technologies without which the human would never be. While we have some sympathy for this view, we argue that true cyborgs have a fundamentally different kind of relationship with technology than their nondisabled peers. Thus, we define ‘cyborg’ as a bodymind which has within it, or fundamentally relies upon, some technology without which significant embodied life functions would not be possible. Without their respective technologies, daily life would be significantly different (or impossible). These bodied technologies, in their intimate relationships with their users, are sometimes viewed as a part of the cyborg’s bodymind: both a necessary part of their everyday life and an affective piece of their relationship with their world. They can also fall out of smooth relation – with maintenance, wear, body changes, familiarity, and time impacting how these technologies are experienced by disabled users.

We need to be clear that just because we include technologies as a definitional piece of the cyborg, this does not require use or contact with the technologies in order to qualify as cyborg. When technology breaks, works poorly, or is set aside, the cyborg remains. Hearing aids may work poorly in a room with a lot of technological noise (fans, computers, fluorescent lights, etc.), or their batteries might die. Prosthetics are not worn 24/7, wheelchairs are set aside for the night, canes and walkers might not be used at all for long periods of time. In fact, the lack of technology at times is key to being cyborg. Jillian Weise talks about how she is afraid when she removes her prosthetic leg, writing,

> I’m nervous at night when I take off my leg. I wait until the last moment before sleep to un-tech because I am a woman who lives alone and has been stalked, so I don’t feel safe in my home on crutches. How would I run? How would I fight back? (Weise, 2018)

We argue, in fact, that this continued affective relationship with technologies even when they are not present is one of the defining characteristics of the cyborg, that separates it from the tryborg, and the wearer of warm clothes in colder climates. The cyborg is habituated (Rosenberger, 2020) to their technologies in ways that fundamentally alter their affective relationship to the world even without them, perhaps especially so. We also use the term bodymind to describe individuals (cyborg and not). Bodymind is a term that highlights the interconnectedness and inseparability of body and mind, asserts that they are one, and observes that things we attribute to body or mind also produce changes in the other. Margaret Price (2014) imported this term from trauma studies, and it has become important in disability studies and Black feminism. This term troubles the neat separation of body and mind produced by longstanding “Western” philosophical traditions. We believe that the separation of body and mind is neither true nor moral, as it has long been used as justification for the oppression and colonization of people around the world, including in the institutionalization, exclusion, and sterilization of disabled people in North America during the eugenic era in the 20th century (and elsewhere). The use of bodymind in this context hews closer to the phenomenological and postphenomenological descriptions of relating-with the world, and foregrounds the necessity of affective relation to the world as necessary for epistemological (and ontological) becoming.

2 TECHNOABLEISM

Most experts about disabled people are nondisabled people. So most of our cyborg stories (including accounts in philosophical literature as well as popular culture) do a disservice to actual technologized disabled people. They come from a place of ignorance about the actual phenomenological experience of disability and tech, and also often rest on accounts developed by nondisabled people *imagining* what it might be like to have a disability - and getting it wrong.

The Cyborg Jillian Weise, disabled poet and provocateur, writes,

> They like us best with bionic arms and legs. They like us deaf with hearing aids, though they prefer cochlear implants. It would be an affront to ask the hearing to learn sign language. Instead they wish for us to lose our language, abandon our culture and consider ourselves cured. They like exoskeletons, which none of us use. They would never consider cyborg those of us with pacemakers or on dialysis, those of us kept alive by machines or made ambulatory by wheelchairs, those of us on biologics or anti-depressants. They want us shiny and metallic and in their image. (2018)

The “us” in this writing is disabled people, while the “they” in this writing are what Weise terms ‘tryborgs’. Tryborgs are those who wish they were cyborgs – who adopt techno-optimistic lenses to view *and market* “high tech” technologies, aimed at “solving” the “problems” of disability and aging. They are those who celebrate technologies most cyborgs can’t access and don’t want, all while regarding and imagining disabled people as the first test pilots toward a transhumanist future. We see the celebration of the cyborg, often divorced from disability reality (or where disabled people are often imagined eliminated, made more palatable, or fixed) from transhumanist circles, such as when Hugh Herr says that he doesn’t see disability, he sees broken technology (Brashear, 2014), or when Zoltan Istvan says we should fix disabilities via exoskeletons instead of fixing infrastructure (Istvan, 2015), or when Ray Kurzweil and Martine Rothblatt suggest that we can construct digital minds into which we might upload or copy our own consciousnesses to become immortal and avoid disability altogether (Kurzweil, 2012; Rothblatt, 2014).

We also witness those in feminist STS — influenced by Haraway — who see the figure of the cyborg as a convenient “out” to binary essentialisms (without any reference to disability, to the already-technologized-everyday people who encounter regular frictions of access, maintenance, and contradiction). Alison Kafer offers a sharp rebuke to those who might use Haraway in such convenience, writing,

> [Haraway] offers disabled people as exemplary hybrids, but without any examination of what such hybridization might feel like or entail. Disability may be an excellent site for witnessing the blurring of human and technology, but not, apparently, for exploring actual experiences of such blurring. (Kafer, 2013, p. 115)

Kafer also argues that Haraway’s use of female factory workers in Malaysia, and the Spiral Dancers of Santa Rita jail as cyborg figures sans any context or well-theorized connection, merely reinscribes imperialist co-option that Haraway is ostensibly pushing against. The cyborg, then, and disabled people especially, get decontextualized and elided, swept up in an imperialist appropriation of hybridity that flattens any distinction between the factory worker, the dancer, or the disabled person.

The problem with many of our narratives — both media and academic — about disability is that they are heavily influenced by eugenic thought, ableism, and ideas about technological redemption of the bodymind (Clare, 2017). Our ideas about cyborgs are necessarily warped by these dominant frames for thinking about disability and about technology (Shew, 2022). Technology is often characterized as redemptive of disabled people, meaning disabled people need this redemption and start from a place of greater need and lower status. And technology is framed as making disabled people more palatable, more able to be “includable” in the terminology of Tanya Titchkosky (Titchkosky, 2011): if people have the right technologies, then they can behave or fit more appropriately in society. This can be about how disabled people look or perform, or serve a function to other people (whether through inspiration or employment). Technology in this context can be set up as determining the worth of disabled people.

When we think about how cyborgs are usually described and understood (as either aspirational technological projects or ironic political mythos), it doesn't actually look like a lot of the disabled people we know and how they actually use technology. We like the working definition of ableism regularly updated by Talilia A. Lewis, which connects ableism to so many other forms of valuation and discrimination:

> A system of assigning value to people's bodies and minds based on societally constructed ideas of normalcy, productivity, desirability, intelligence, excellence, and fitness. These constructed ideas are deeply rooted in eugenics, anti-Blackness, misogyny, colonialism, imperialism, and capitalism. This systemic oppression that leads to people and society determining people's value based on their culture, age, language, appearance, religion, birth or living place, "health/wellness", and/or their ability to satisfactorily re/produce, "excel" and "behave." You do not have to be disabled to experience ableism.[1] (Lewis, 2022)

Ableism reflects not just dispositions of bodyminds, but the values societies overlay on those bodyminds. Those who are not disabled feel pressure to remain so. Wellness culture, fat-shaming, and the kinds of pity narratives one sees in commercials for disability charities all point to how our bodyminds need to be in order to maintain their cultural (and production) value.

We use the word technoableism to describe a phenomenon being identified across disability literature – where disabled scholars and activists recognize and decry how disabled people are often mere objects in design, to be designed around, and then used in stories that laud the nondisabled helpers around them (Shew 2023). Technoableism is a way to describe the stories about disability and technology – about cyborgs – that often come from nondisabled points of view. They come from nondisabled "experts" about technology that often do not have a deep, community-rooted cross-disability knowledge here and lack important knowledge about the stigmas and structures in which the disabled objects in their studies have to exist. Technoableism ends up covering disabled people's voices and elevates non-disabled helpers as true experts. Even many approaches framed as "empowering" disabled people are inflected with technoableism: you need this technology to empower you! The underlying assumption is that disabled people need to be empowered by technologies and by helpers. God forbid disabled people decline a technology, or aren't appropriately willing or grateful to try something out! They get labeled as bad cripples, as not trying hard enough or wanting to be normal enough, to be worth time, consideration, or inclusion (Herdegen & Shew 2023). Technoableism makes inclusion come with a pricetag: you must perform your role as a consumer in our technological society by yearning for and buying up that which we promise.

Technoableism is also about how our narratives — the ones we receive, the ones that are historical, our media picture of disabled people — give us the wrong impression about what disabled people want and need. For so long disabled people's voices have been talked over. This is nearly a tradition in philosophy, and not just a critique of wider tech culture or societal ableism. Disabled lives are made into marginal cases, thought experiments, and "fun" bioethics

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[1] A lot more could be written about this last sentence. Disability provides a logic that serves as a justification for discrimination for difference, even when the difference is made up. Especially with regards to racist technologies posited as things that help "normalize" (but not really) an already-normal body – with skin whitening and tanning technologies, particular types of hair treatments to bring them in line with particular ideas of beauty, etc. These technologies are often billed as empowering for those that adopt them, just like disability technologies – and maybe they might be in a world that is constructed against the way your body is, where you can claim more power and space and avoid critique for looking how you naturally look. But we would have to see this in the larger structure that puts people under such scrutiny.

case studies (Reynolds, 2017; Shew, 2020). So in our projects around technology and disability, even those philosophically-oriented, we often see a deep bias against disabled ways of life (of appearing disabled at all) and in favor of non-disabled ways of life — ones that emphasize the normalization or elimination of disability, or view things (people) as interesting problems left to be solved.

3 IMAGES OF THE CYBORG

Most disabled people are living their lives against the backdrop of media-driven images that frame their differences as grotesque, pitiful, or inconvenient. These images produce and reinforce technoableism, framing the mechanical parts of the cyborg as as good or better than the flesh version, and thus a “cure” or “fix” for disability, or as grotesque overreach and a visible indicator of villainy and hubris. The disabled cyborg becomes a target of suspicion and fear through the lens of media depiction. Because disability has often been included along with race and homosexuality as a threat to a pure society (and subsequently attempted to be purged, see: eugenics, U.S. sterilization programs, and the Holocaust), depictions of cyborgs set expectations for what being disabled will be like.

Films like *Cyborg* (Pyun, 1989) and *The Terminator* (Cameron, 1984), and their sequels, depicted cyborgs as villains, usually of military origin, who use their “normal” human appearance as cover for their various misdeeds. These depictions draw on the same tropes as horror films like *Invasion of the Body Snatchers* (Kaufman, 1978), or even fairy tales about changelings, which often warned of undetectable invasions from outside, nefarious, forces (be they fae, alien, or nation-state). Other films, like *Alita: Battle Angel* (Rodriguez, 2019), and *Ghost in the Shell* (Oshii, 1995), retain the military angle, but our protagonists are the cyborgs, often conflicted about the technological portion of their bodyminds and what it says about their humanity. Victor Stone (aka Cyborg) from the DCEU films (and the DC comics from which they were adapted), similarly worries about his humanity when so much of his bodymind is now machine. The cyborg’s technological complement is only ever a threat, either to others via internal and hidden weaponry, or to the fundamental personhood of the character. These fears and beliefs get reflected onto disabled cyborgs, where each new technological intervention carries them further away from “fully human” in the eyes of society.

Cyborgs in media depictions are almost always the apotheosis of human ability and appearance. The apotheosis image feeds into both the technologist idea of the shiny, functional, and super-human cyborg as well as the super-crip narrative for disabled people (Fecteau, 2016). Actors who play cyborgs are always at the peak of physical form. Even media whose cyborg protagonists have some level of antipathy towards their technologized bodies depict them as superhuman. Motoko Kusanagi, protagonist of *Ghost in the Shell* is a master hacker with a high-end military body able to (almost) take on a tank in a one-on-one fight (Oshii, 1995). Alita, the cyborg protagonist of Battle Angel Alita, is similarly equipped with a high-end military “berserker” body, but also has access to fighting techniques beyond even what that body is supposed to be able to do (Kishiro, 1990). Adam Jensen, protagonist of *Deus Ex: Human Revolution*, can remotely hack the electronics of grenades mid-air, and leap off of buildings with ease, making his early protest that “I didn’t ask for this” feel somewhat performative and insincere (Dugas, 2011).

Commercials feature cyborgs running on carbon-fiber prosthetics, throwing footballs with artificial limbs. Image searches of the term cyborg give us pages and pages of results of artistically-rendered perfect human specimens, except with metallic or bright white plastic parts. Every woman a perfect five-foot-six (i.e. taller than average, but not so tall as to threaten male average height), slim build, white-passing supermodel. Every man a jacked athlete with perfect hair and a square jaw. Nowhere do cyborgs struggle, are fat, or Black,[2] are gender nonspecific (most are hyper-gendered), or do mundane things. The technological parts of media cyborgs are always either perfect replicas of the flesh version (if, perhaps, metallic or plastic), or super-specialized gear like sprinting blades or weapons. These evoke transhumanist and technologist notions of perfect adaptation to an individual task. Nowhere do cyborgs get to just be. Human. Normal. No, they must be super. When they do fail, they often do so spectacularly, falling into the second trope: grotesquerie — a violation of the human revealed through fascinating horror.

The cyborg as grotesquerie feeds into the belief that altering the human body is a violation of the "natural" or "holy" way of being. It twists the apotheosis image into an act of hubris and overreach. This is usually revealed near the climax of the film in question where the machine parts underneath are revealed and the verisimilitude of the cyborg is destroyed, often through gory body horror. Examples include the emergence of the glowing red eye of Schwarzenegger's T-800 character[3] in the first Terminator film; the removal of the skin of his arm to convince Dyson of his folly in *Terminator 2: Judgement Day*; the fight in the alley between Alita and Koyomi in *Alita: Battle Angel* (Rodriguez, 2019) where Koyomi reveals her limbs to be spider-like and bladed; and the climactic scene in *Ghost in the Shell* where Major Motoko Kusanagi destroys her own body attempting to disable a tank that is protecting her target. These reveals remind the viewer that the cyborg is not, in fact, fully human and is both more powerful and more dangerous than their"normal" appearances would lead us to believe.

Grotesquerie in cyborg stories is often (though not always, see: the *Ghost in the Shell* scene described above) used as a part of the "ugly is evil" trope, by revealing the villainy of the cyborg through the body horror of the machine parts' reveal. "Ugly is evil" is perhaps best illustrated through the James Bond series of films, whose villains are almost all physically disabled, scarred, or deformed in some way. Blofeld, a recurring villain in the series, has a scar over his right eye; Silva from *Skyfall* is missing much of his facial skeleton, which he replaces with a prosthetic for much of the movie, only removing it when he does his villain reveal monologue to Bond (we could include many, many more examples). This trope has long been entangled with a stigma for disabled people that their disability or disfigurement is indicative of moral failing, which was one of the many justifications for the institutionalization and sterilization of disabled people during the eugenic era. This stigma even led to laws against being visibly disabled or disfigured (or poor) in public (Schweik, 2009).

Meyer and Asbrock (2018), in a paper called "Disabled or Cyborg? How Bionics Affect Stereotypes Toward People With Physical Disabilities," describe surveys they did about bionic devices on people with physical disabilities. These surveys gathered strong initial data showing how bionics make nondisabled people perceive disabled people as more competent (but still not as competent as nondisabled peers; this is consistent with technoableism), while also perceiving the bionic-using disabled people as "less warm" (consistent with the long history of tropes depicting cyborgs as other, as grotesque, as unnatural or fundamentally different). It's deeply troubling that so many narratives about disabled life are told by nondisabled people, often emphasizing stereotypes, especially when these narratives about disabled people cast them as less trustworthy, less warm, less able to self-determine. Recovering the cyborg becomes a larger project against this backdrop, against ableism bias and longheld beliefs.

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[2] There are a few exceptions, here. Victor Stone (aka Cyborg) from DC comics is perhaps the most well known. Others, like Del Spooner from the 2004 film I, Robot, played by Will Smith, and Takeshi Kovacs, from the second season of Altered Carbon, played by Anthony Mackie (a season which dropped during the original drafting of this article) also count, though more are difficult to think of (h/t to our reviewer for reminding us of the latter two examples).

[3] Some might argue whether the T-800 counts as a cyborg because it was a robot covered in (engineered) flesh rather than a human who had acquired robotic parts. However, the film itself describes the T-800 as a cyborg, and we would reject that a human origin is necessary for cyborgness.

Some of these beliefs are religious. Harriet McBryde Johnson, in her book *Accidents of Nature (2006)*, a book about disabled kids at disabled summer camp, has this wonderful exchange between two young disabled women, one who says simply that she wishes there was just one story in the Bible where the crip didn't get cured – so that people could leave her alone for being disabled in public, so that she wouldn't be prayed over, so that people could let her be and be disabled (and also be okay being disabled).[4] There is also a long history of disfigurement and disability as indication of moral failing or falling out of God's grace in religious texts. The "Mark of Cain" (Genesis 4:15-16) has been claimed to be everything from a scar or visible marking, to the dark skin of African peoples (Junior, 2020). Religious films and literature depict demonic possession in ways that disfigure people (see: The Exorcist series of films). These associations with evil and sin and of the holiness of their "cure" are not benign.

How we respond to and regard others often hinges on what we imagine, and our imaginations are shaped by our experiences. Our imaginations have often been filled with garbage where it concerns disability – with nondisabled writers, actors, and directors filling in from their own imaginations. According to FilmDis.org, a site created in 2014 by Dom Evans and Ashtyn Law to track disability representation on TV and film, from 2020-2022, of the 1,342 disabled characters shown on the major U.S. television networks (CBS, NBC, ABC, FOX, and CW), only 110, or 8%, were portrayed by known disabled actors. Because more than half of all disabled characters are in bit roles, and due to the stigma around disability itself, it can be difficult to determine whether a disabled character is actually depicted by a disabled actor. Thus, for more than 65% of the roles on TV, it is unknown whether the actor was disabled or not. Still, 395 — or nearly 30% of all disabled characters — were played by known nondisabled actors, something FilmDis calls Disabled Mimicry. The numbers get even more dire when race and sexuality are included (FilmDis.org, 2023). So, not only are depictions of cyborgs generally negative, disabled people are rarely able to depict their own or like bodyminds in authentic ways; this is even more so for non-white disabled characters, who are less often depicted at all. These abled depictions (both from a writer and actor standpoint) lead to stereotypical portrayals of disabled cyborgs, reinforcing harmful tropes and also further solidifying ideas that *dis*abled people are *un*able to speak on their own experiences.

4 ACTUALLY BEING A CYBORG

So what is it like to actually be a cyborg? On what better grounds can we rest a philosophy of cyborg-technology relations? There are certain approaches to disability technology that do harm to disabled people. But many disabled cyborgs like some array of technologies. We're not throwing down our pills, ostomy bags, or hip implants – although stories of Deaf young people flushing their hearing aids down a toilet can be exciting TV.[5] What many want is a world where the experiences and stories of disabled people are less written-over and bulldozed by dominant narratives, where assumptions about bodyminds play less into how people assess worth, where cyborgs can be regarded as experts about cyborg existence and about the sorts of technological projects they actually care about, where cyborgs can be their own projects (or not be projects at all!) if that's what is preferred. It's hard to be seen and witnessed outside of the long shadow of eugenics and transhumanism, where disabled bodyminds get cast as bad, broken, and calling out for help. We get the many stories of technology and of disability wrong constantly in this shadow.

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[4] Praise for high tech disability devices driven by nondisabled demands and led by nondisabled designers seem especially off in this light. Is this just a new way to proselytize a redemptive gospel where technology is lord?

[5] Detailed on the reality tv show DeafU. If you know the history of cochlear implants, oralism, and Deaf education, this might not be surprising to you. You should check out the novel *True Biz* by Sara Nović for more context here too.

Autistic HCI and STS Scholar Rua Williams explains, in the context of technologies designed for autism intervention that

> Technologies for autism are dominated by metaeugenics via the logics of the interventional, these normalizing technologies seek to correct aberrant behaviors, shaped normative social responses, and remediate deficits and delays. This approach seems natural and necessary from the perspective of the helping professions, guided by a conviction that their role is to deliver health and wellness - a restoration or purification via the equation of the norm with health…. The logic behind such interventions is that access is conditional upon whether the body is includible or not. The interventional approach is so naturalized that to not intervene is regarded as synonymous with causing harm. (Williams, 2019)

Disabled people occupy our narratives about what we should do as medical design professionals, technology professionals, and engineering professionals. People in helping professions are set as helpers who should be working to normalize disabled people. And if you don't, then it's considered a harm: there's this moral imperative about what the proper role of technology is for disabled people (Williams 2019). Indeed, whole professions have arisen around normalization of disabled bodyminds.[6]

In the shadow of eugenics, technology can never just be a tool that's handy sometimes; it's always important, life-changing, and will make disabled people worthy (or human). It makes designers (and the public more broadly) value the new and "innovative" in ways that let systems of technology and body maintenance languish. Indeed, we see that with the horrible systems for wheelchair repair. Just to note, wheelchairs are not viewed by the general public, physicians, and engineers in the same way those in the disability community view them. Though there are varying accounts within the disability community, and among wheelchair users themselves, rarely do we see representation of wheelchairs as a *good technology* outside of the disability community – even though this is not a rare sentiment. The idea that we need better devices in this area drives a lot of "design for good." However, maintaining a wheelchair has become significantly more difficult over the past decade, labeled a crisis by disabled advocates. Wheelchair user and bioethicist Liza Iezzoni explains about wheelchair repair in the U.S. that,

> The two behemoths owned by private equity firms that now dominate the marketplace focus on boosting profits and cutting costs. By reducing technician hours and parts inventories, restricting consumers' access to parts and software passcodes, requiring pre-approvals from insurers for repairs, and other practices, these companies virtually ensure delayed repairs. (Iezzoni, 2022)

Similar worries about access and repair feature in narratives from the United Kingdom's National Health Service. If one's wheelchair is uncomfortable, broken, or poorly made, it can be a life-threatening event. William Peace, who blogged regularly under the pseudonym "Bad Cripple," wrote about this on his blog in April 2019,

> Even the most minor wound can send me into a tailspin of depression and fear because I know a minor wound can blossom into a life threatening wound in days. Sepsis can set in and one can die very quickly. I learned all about sepsis in 2010 when a wound almost ended my life. (Peace, 2019)

Peace died of sepsis from pressure wounds less than four months after this post.

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[6] Harlan Lane, in "Constructions of Deafness," lays bare how the medical model of deafness shaped new professions and reconfigured the "right ways" to be deaf – often in opposition to Deaf community, Deaf autonomy, promotion of signed languages, and community-driven approaches to appropriate tech.

Cyborg Design and Cyborg Maintenance (Earle, 2019) are crucial in understanding what actually being a cyborg entails. Cyborgs do not simply use or know about the technologies upon which they rely. They design, build, hack, and repair them as well. Bess Williamson, a disabled scholar, writes about how disabled people made, used, and altered their surroundings and technologies in the years following World War II. She describes how disabled people shared their ideas through community-centered publications like the *Toomey J. Gazette* (which ran from 1955-1989 and focused initially on post-polio and paralyzed people), where they developed and built, often with the assistance of family members, mouthsticks for typing, ramps for getting into and out of their homes, cars with modifications to accommodate wheelchairs and wheeled beds, and home modifications to doorways and hallways to fit those same mobility technologies (Williamson, 2012).

Laura Mauldin has shown us visually the mods people are still making on their homes and spaces with the website Disability At Home (https://www.disabilityathome.org/), a project meant to document disabled ingenuity (Disability At Home 2022; Mauldin 2022); Mauldin's forthcoming book, *Care Nation,* addresses some of care work that falls to unpaid and informal caregivers in systems that do not provide adequate support. Leah Lakshmi Piepzna-Samarasinha, a former performer and leader with Sins Invalid*,* has written (beautifully, and often as poetry) for years about mutual aid and care in disabled and other marginalized groups. Piepzna-Samarasinha writes in the poem "Crip Fairy Godmother":

> Disability is adaptive, interconnected, tenacious, voracious, slutty, silent, raging,
> life giving…
> We know shit they'll need to know
> We know shit they have no idea of
> We have survived a million things they said would kill us
> We prove them all wrong…
> I can organize my whole community without ever leaving my bed
> I can show you how to make a ramp out of some styrofoam and a hot dog…
> I can run this whole show tapping emails on my phone with my forehead…
> I can make sure we all make it
> I can see my vulnerability
> not as a crime. (2019)

Their prose book *Care Work* is a guide or tool kit to disability community care work – and about radical love, disability justice, and community power (Piepzna-Samarasinha, 2018). This work speaks to a larger picture where disabled people are often caring for other disabled people in networks, especially in marginalized communities where official or institutional support may be either few or too dangerous to access.

Liz Jackson, a disabled independent scholar, calls disabled people the original life hackers, describing how Betsy Faber designed the popular OXO brand of kitchen tools to be easier to manipulate with her arthritis. Her husband is usually the one credited with creating them, and lauded for helping his poor, arthritic wife — but he simply had the devices manufactured to her specs — further cementing the idea of disability as inability, and the people around them as heroes for their work to make things for them (Jackson 2018). Even when the products do not become purchasable in most large chain stores, disabled people are designing and repurposing technology every day, from using tongs to pick up dropped items, to modifying a prosthetic's fit with socks, to waterproofing a power chair with plastic bags so it can work outside.

Some STS scholars focus on different and particularized types and aspects of cyborg (or potential cyborg) life, with historian Jaipreet Virdi's work on the marketing of hearing devices in the context of deaf life (2020), Bjorn and Markusse's work implantable cardiac defibrillators (2013), Lucie Dalibert's work on intimacy with devices in the context of spinal cord stimulation

(2015), Kirk Besmer's description of cochlear implant intentionalities (2012), and Vivian Sobchak on dancing in different cyborg configurations as an amputee (2005).

Technology work is not new for disabled people, and so many report how exhausting to always have the assumption that disabled call out as if in need of remediation, as if long-term disabled people are incapable or inexperienced, especially given the ways in which so many of us are forced by necessity to hold some technologies intimately, to DIY and lifehack, to learn systems for assistive tech, and how to get what exists to do what is needed.

It is against the backdrop of Crip Technoscience – a term from Kelly Fritsch and Aimi Hamraie – that we develop our work on cyborg-technology relations (Hamraie and Fritsch 2019). They write: "Disabled people use technoscience to survive and alter the very systems that produce disability or attempt to render us as broken." Crip technoscience entails four commitments, explored by Hamraie and Fritsch:

1. Crip technoscience centers the work of disabled people as knowers and makers.
2. Crip technoscience is committed to access as friction.
3. Crip technoscience is committed to interdependence as political technology.
4. Crip technoscience is committed to disability justice. (Hamraie and Fritsch 2019)

Disability Justice is a political, arts, and community-based movement, led and articulated by the San Francisco, California-based group Sins Invalid. The group is comprised of black, indigenous, queer, and other multiply-minoritized disabled people. Their Principles of Disability Justice speak to the ways in which disability is bound up with other types of differences, and how we need cross-disability, cross-community, cross-movement solidarity for political action, as well as leadership of "the most impacted" where capitalism, false ideas about independence, heteropatriarchy, and white supremacy have colluded to hurt some people far more than others (Sins Invalid 2015).

Against this backdrop of cyborg technicians, crip technoscience, and politically disabled work, it's important to recognize the ways in which disabled people are already engaged (sometimes against their will) in the projects of technoscience, and not always merely as subjects. *A philosophy of cyborg-technology relations keeps disabled people in the world.* And that world is never apart, and "human/technology" is never clearly slashed.

5 DEVELOPING A PHILOSOPHY OF CYBORG-TECHNOLOGY RELATIONS

Two dangers of proposing *a* philosophy of cyborg-technology relations are that, 1) we risk the argument that there can be only one, ours; and 2) that cyborg-technology relations are an intellectual exercise, to be debated and discussed, and, perhaps, rejected (as in the narrative in Johnson, 2003). We resist these as much as possible, arguing instead that cyborg-technology relations are specific to the ecological position and context[7] of every cyborg (and will vary over time regardless), and that this relationship cannot be reduced to a set of philosophical tenets described in a paper or a diagram (see: Verbeek, 2008). Cyborg-technology relations describe the lived experience of real people. Though we couch our arguments in the language of

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[7] Our stance here aligns well with the Disability Creation Process (DCP) described by Fougeyrollas and collaborators (1991, 2019), which is "...rooted in an interactionist understanding of humans as the products of an ongoing process involving biological, physical and cultural systems" (2019, pg 26). DCP supports the agential realist and care ethics positions we take, as well, and will be an important way to expand our model beyond the English-speaking realm in which it is currently based. While broad involvement of DCP must remain beyond the scope of this paper, we hope further work can be done to bring these ideas into more direct conversation.

phenomenology, postphenomenology, agential realism, and other philosophical frameworks, no person fits within any single framework, or even a suite of them. All models, all frameworks, are simplifications, and thus miss the totality of and myriad ways of being cyborg. We allow that our descriptions here will be insufficient to describe any individual cyborg experience. We hope, instead, that we describe some useful tools to understand the lived experience of disabled people.

As useful as phenomenology and postphenomenology are in describing human-technology relations, it is limited as a fundamentally epistemological framework. The cyborg is an ontological, political, and ethical category: a fundamentally *different kind* of being than (post)phenomenology can describe. Postphenomenology describes how technologies are multistable (Ihde, 2012), a valuable tool in cyborg-technology relations. Mediation, however — the postphenomenological description of how technologies sit between humans and the world,[8] altering their ways of knowing said world — is wholly insufficient for the ontological being of a cyborg. A pacemaker, for instance, doesn't sit between the cyborg and *anything* (Oudshoorn, 2020). It is a constituent part of what produces the very category of "cyborg." The technologies that produce the agential cuts we call "cyborg" are not just tools of knowing (though they are that as well), they are tools being and relating.

Peter-Paul Verbeek adds on cyborg-technology relations to Ihde's postphenomenological categories, categorizing them in Ihde's style as: human/technology > world. Cyborg here is represented as 'human/technology' (Verbeek 2008). We want to argue that the constitution of cyborg is much more wavy or bumpy or disjointed than this squish of human/technology allows. Though we love the anti-foundationalism, pragmatism, and experiential focus of postphenomenology, we think this squish of human/technology undersells the experience of cyborg embodiment, especially since living closely with technology as cyborgs often involves reliance on and constant interaction with infrastructure, social and material, that is hidden in "human/technology > world." And also hidden in how much the world itself enters into the existence of cyborg, often in less of a background relation than others are experiencing; think here of the buzz of fluorescent lights that some autistic people report hearing, and sometimes being overstimulated by; the experience of world and technology is made bumpier by disability. Focal objects can shift in ways that often go unanticipated by neurotypical, nondisabled people.

Consider a technology like the Dexcom continuous glucose monitor as it might be used by a Type 1 Diabetic[9]. The Dexcom provides real-time data on your glucose levels by having a small needle through your skin. You can look up your data on your phone at any time with the right app – and other people can look at that data too, in many cases a parent, carer, or doctor also has that real-time information about you. You wear the Dexcom on your arm (typically); once a week, you remove it, get a new spot, and get a fresh specially cut bandage to tape it securely in its new spot. This is when everything moves smoothly and the device works properly. It's always there; people might be able to see it and make inferences about you. You (or a family member) are expected to be your own cyborg technician: rotating the spot, changing the tape, making sure everything is working. It's great when it works, and provides a lot of peace of mind that you might catch a bad set of reading in time to course correct.

This technology is connected to a network. It talks to your phone. Your data goes into large servers. Dexcom is a company with competitors. In good news, the company is doing well, so worries about obsolescence or discontinuing of service are maybe less present with you for the moment. Though when those happen, they are awful for the disabled consumers who rely on this tech – see Strickland and Harris 2022 on bionic eyes that no longer work, Friedner 2023 on

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[8] The authors might argue more generally about the utility of a framework that separates humans and the world - as if humans are not always already a part of the world (and vice versa) - but that argument is for another paper.

[9] For a much longer STS discussion of options, companies, approaches, and their impact on T1D patients, see Brantly 2023.

obsolete cochlear implants, and Hamzelou 2023 on a working brain implant removed against a patient’s wishes. Worries about the company going belly up or shutting down without warning might be at bay for the moment. You may have chosen Dexcom for this reason: that so many others in your community are using it, so you have access and knowledge from other users. But there are other options here – including a growing DIY movement for open source community-driven technology that competes with Dexcom. You may have heard more about this in the wake of the U.S. Thanksgiving holiday weekend 2019 Dexcom outage: where warranted alarms were not sounded for individual users with low blood sugar. As one news piece explains (Salomon 2020): “some [parents] awoke on the morning of the Dexcom outage, Saturday, November 30, to find out children had become hypoglycemic (having low blood sugar) while sleeping.” The company blamed a server malfunction, but this malfunction led to dangerous conditions for many of its users, who experienced days of interrupted service for a technology that literally helps them keep themselves alive. The outage, which you may be aware of as a user, might make you more regularly check the Dexcom website for outage updates, and cause significant worry and backup planning. Perhaps you’ve grown used to – or started with this technology rather young – so you may not know how to monitor your glucose well without this convenient device.

Some technologists and philosophers rightly worry about the impacts of deskilling with some devices, but the deskilling we see here can turn deadly quickly. People with T1D are often subject to far more medical education and are expected to be their own technicians on a daily basis. Being a cyborg here involves the world constantly weighing on you, not just your human/technology setup. You are connected not just to a technology, but to a larger world of servers and companies and other community members. And this is a case of a technology that users love and where there are other options, and not one they are forced to use. *To be cyborg is to be forced to recognize the radical interdependence of your life, to take care as a matter of survival.*

And this is when things are going well. When the technology is “true” to you. Davis Baird (2004), in his work on thing knowledge, talks about truth in technology. While the linguistic turn took us to seek “justified true belief” for knowledge, the “thinginess of things” (Baird’s phrase) gives us material truths. We can talk about a “true wheel” and of “truing a wheel,” the process of improving the roundness of some circular item so that it runs better, runs more true.

Cyborgs feel this material truth too: when objects work especially well for our tasks, when a prosthetic leg feels fluid in motion on your body, when the pacemaker is synched and maybe you don’t think about it constantly for a while, when the servers are running with us. But, as with all material things, they *fall out of true,* they experience outages, and require maintenance and monitoring. This is where the squish of human/technology leaves something out from the experience of cyborg too. The world is always with cyborgs insofar as the materiality of cyborg bodyminds is fallible in ways that, while true of the human body more generally, have a character of separateness, of “not me” that nondisabled body failures don’t seem to entail.

As a leg amputee, a coauthor here notices a strong difference in walking between different pairs of shoes; they feel different, almost every single pair, and why she has a collection of sandals of the same make and model in different colors. Switching between shoes that are alike causes less disorientation at the start of a day, less remembering how to walk, less focus required to step, less worry about tripping. It was never that way pre-amputation. This is just between different pairs of shoes with the exact same prosthetic leg. often complains about switching between pairs of shoes. Cyborgs know their tech parts can be switched out for new ones, and that the new ones might not be the same in feel or experience, and that this is the way of things.

We must, then, bring in new tools to describe cyborg-technology relations. We must attend not just to the knowing of one's bodymind or the world via technology, but also the alteration of the ontological, material, being of the cyborg, as well as the cyborg's relationship to the world and others, i.e. the ethical responsibilities that get reshaped by the ethico-onto-epistemological reality of the cyborg.

Earle (2021) offers two additional tools: agential realism (Barad, 2007) and the ethical framework of care (see: Noddings, 1984; Mol, 2007; de la Bellasca, 2017; and Piepzna-Samarasinha, 2018). Both frameworks rely on foregrounding relationality. In agential realism, Karen Barad puts first among equals ethics, i.e. the relationship and responsibility (here in the literal sense as "able to respond"), in her ethico-onto-epistemology. In agential realism, things are sympoietic, i.e., they become-with their surroundings (contra a Heideggarian autopoiesis). This includes the world, and the technologies we use. The world is never something simply to be perceived (as it is often represented in phenomenology and postphenomenology), but a constituent part of what it is to relate, be, and know simultaneously. We and our world and our technologies are thus intra-actively produced through the diffraction of ourselves and our environment.

Care, similarly, foregrounds relations over time as the basis of our ethics. Care requires that we listen to and understand each other, that we acknowledge that we are dependent, or more specifically, intra-dependent on and through each other. Care acknowledges the variability of function, health, pain, struggle, and success. Care does not seek cure, but rather offers relation and context. Both frameworks, agential realism and care ethics, require negotiation with local contexts, environments, and politics, which means that neither framework is scalable. They must focus on the local. This runs counter to neoliberal capitalism, which is always seeking to make things scalable and fungible, and also in philosophy, which often seeks universalization in its frameworks. The incredibly contingent existence of the cyborg resists such universalization, resists scalability, and requires a focus on local, intimate, everyday lives.

Here we must also caution against exercises in empathy that perpetuate nondisabled speaking over disabled people. Many people have tried to address the lack of understanding of disabled people through "Crip for a Day" exercises, virtual reality games, old age simulation suits, and disability simulations of all sorts. The sociological data on these exercises is that they don't actually produce empathy for disabled people. They are often feel-good and fun games that actually make people more afraid of becoming disabled and view disabled people as less competent than they did before (Silverman 2015; Nario-Redmond et al. 2017; Riccobono 2017). Many in the disability community (Ladau 2014) and beyond (Eveleth 2018) have pointed to the failures of simulation to meet the desired end of empathy. For most simulation exercises – whether through VR, suits to model fatness or age, or more traditional exercises that blindfold sighted people and ask them to navigate or try out a wheelchair for a day – what participants experience, at best, is the first-day of a newly acquired disability or state of their body. Participants in these experiences often think they understand more, but this is just another way to hand over expertise about disabled people to nondisabled people. These exercises never model the social experience of being disabled, or show what it's like to navigate a sordid system of benefits or certification to get accommodation, or what it's like to realize how people view you very differently than they once did. All of the structural and social factors are gone: the focus is a functional one, and one that reflects a new functional difference – a time at which someone is still learning to navigate, or building up the muscles they will now use more, or learning new ways to do things. This allows participants to just see functional struggle as the most salient feature of disability. It is reductionistic and gives the wrong impressions, all while allowing nondisabled people to think they are learning about the experience of disability and becoming more empathetic to the "plight" of disabled people, which they witness only in personal functional terms and not directly in the structural and social terms.

Similarly, in scholarship and writing, we must resist the urge to simplify and reduce the cyborg. The formulation “human/technology > world” no more describes what it is like to be a cyborg than wearing a blindfold or pushing a wheelchair for a day. Disability simulations give the impression of human/technology as unwieldy and bumpy, and certainly don’t glamorize the experience, but simulations also fail to capture how the world has always already played into the experience of being a disabled person with technology. On the other hand “human/technology > world” artificially smoothes out those relationships, eliding the places where it *is* bumpy, and removes structural and social factors altogether.

6 CONCLUSION: LISTENING TO CYBORGS

Aimi Hamraie and Kelly Fritsch write in the Crip Technoscience Manifesto:

> Disabled people are experts and designers of everyday life. But we also harness technoscience for political action, refusing to comply with demands to cure, fix, or eliminate disability. Attentive to the intersectional workings of power and privilege, we agitate against independence and productivity as requirements for existence. Instead, we center technoscientific activism, and critical design practices that foster disability justice. (Hamraie & Fritsch, 2019)

We will have better insights into human-technology and cyborg-technology relations when we study and listen to actual cyborgs here – those of us who are subjected to breakage and infrastructure outage and historically overwritten by those who call themselves “champions” for disabled people.

This project – which is ongoing for both co-authors in different ways – brings together a larger push among philosophers of technology and STS scholars who are interested in social justice and working against biases that we build into our technologies and systems (Williams, 2023), and more broadly the making of better things that consider users and those implicated in use in serious ways. We are interested in cyborgs as a political and politicized category – keeping cyborgs in the world, but one where disability communities constitute the most crucial stakeholders, storytellers, and witnesses to cyborg-technology relations.

Cyborg-Technology Relations must take into account the politics of being disabled, the politics of being cyborg. Too often, cyborgs have been seen as theoretical or as case studies; but they walk (or don’t walk, which is okay too) among us. We need a philosophy of cyborg-technology relations to recognize the vulnerability that exists within capitalist-industrialist frames of our existence, especially within increasingly business-controlled means in order to access basic services for life. We think here about technological obsolescence, planned and unplanned; about maintenance, and lack thereof; about the social experience of disability; about how disabled people are framed as expensive, burdensome, and pitiful, in ways that work against their full participation and toward their exclusion.

We call for a political and politicized philosophy of cyborg-technology relations, and we find this all the more pressing when we recognize that our futures will be more disabled, not less. Though this is written about elsewhere, especially in the work of Alice Wong, Patty Berne, and Leah-Lakshmi Piepzna Samarasinha and many other disabled leaders, rarely do we see this acknowledgement in scholarly work and in conversation within philosophy of technology. The future is certainly more disabled – more people will be disabled in the future – due to climate change, especially with changes in weather patterns creating new patterns of disease and new and more intense weather events (Shew 2023). We already see Lyme disease spread far beyond its usual places, and such new tick-borne diseases like Alpha-Gal. We see climate events wreak increasing damage, causing acute injury as well as ongoing terror for those in its wake. Our recent experience with COVID-19 also will have long-term social effects, with a high number of people experiencing long COVID, such that we are witnessing shifts in employment (with people who are unable to work due to the fatigue and lingering and long-term impacts of the disease). Even in shinier future predictions, everyone who goes will be disabled in and by space, should our technology develop such that we can get off-world (Shew, 2023). It's all the more pressing to plan for disabled people – and to plan for real cyborgs, not the idea of cyborgs – given our collective disabled future. We need a philosophy of cyborg-technology relations with wings and fangs.

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