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ARTICLE

Cyberpunk's Other Hackers: The Girls Who Were Plugged In

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Abstract

This article locates an alternate paradigm of hacking in feminist cyberfiction, notably, James Tiptree, Jr.'s proto-cyberpunk novella, "The Girl Who Was Plugged In" (1973). I argue this story critically reorients our understanding of how information technologies and their material artifacts construct and reinforce norms of able-bodiedness and ability. Drawing on archival materials from Bell System, early information theory, and crip theory, my reading reveals that Tiptree's portrayal of disability is tied to a cybernetic conception of error and noise. These frictions between users and their machine interfaces materialize unexamined performances of critical labor and noncompliance that I link to the emerging field of crip technoscience. Tracking these disruptions in cybernetic feedback across "The Girl Who Was Plugged In" and in historical accounts of the telephone switchboard operator, I show that error and noise underpin an early example of a feminist hacking ethos, and also crip accounts of electronic disembodiment often imputed to information society and cyberpunk fiction.

In 2017, the Silicon Valley non-profit organization Girls in Tech announced "Hacking for Humanity," a global initiative that focuses on "solving problems for the benefit of the greater community," rolling out hackathons from San Francisco to Melbourne. The rise of tech empowerment programs, such as Girls Who Code, Hackbright, Girl Develop It, and intersectional feminist

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hackerspaces across the United States has brought further attention to the effort to "hack the gap." Even as the gender disparity persists in the tech industry, in recent years scholars have recovered women's contributions to the history of computing and network culture as a *cause célèbre*, such as Janet Abbate's *Recoding Gender* (2012), Amy Sue Bix's *Girls Coming to Tech!* (2014), and Liza Mundy's *Code Girls* (2017).[1] By Abbate's reckoning, "female programmers and computer scientists leveraged their status as professionals to fashion new personal identities that united femininity with technical expertise" since the Electronic Numerical Integrator and Computer (ENIAC) "girls" and the origins of digital computing (p. 4).

However important this critical reorientation is, these accounts stop short of examining how information technologies construct and reinforce norms of able-bodiedness and ability, or where we might find alternate models of the hacker ethic outside of traditional hackerspaces and histories. In 2013, Liz Henry, a Silicon Valley programmer who works for Mozilla debugging Firefox's web browser, helped co-found San Francisco's feminist hacker/makerspace Double Union. Henry is a woman hacktivist and a powerful "coder grrrl" in San Francisco's tech circles, yet she serves as a striking reminder of how disability advocacy in feminist and intersectional hacker communities is largely absent. Henry's passion project at Double Union—compiling data on the battery lives of her mobility scooters and electric wheelchairs—indicates signs of change. "My ultimate goal [is] to design open source hardware for electric scooters," Henry says, "so people with disabilities can actually specify what we need" (as cited in Garretón, 2013).[2] Henry models a feminist hacker ethic that prioritizes values of care and inclusion, drawing on her position of "emancipatory alterity," a term I borrow from Lilly Nguyen, Sophie Toupin, and Shaowen Bardzell (2016), to shed light on the invisible and gendered "infra/structures of power that render technological achievement possible." Yet as a woman with a disability, Henry operates bilaterally from a position of "emancipatory alterity" to expose not only the gendering of techno-labor but also how disability can interrogate notions of technological access (see Ellcessor, 2016). Favoring the logic of user-driven, epistemic open access, Henry

refuses the assumed narrative of forced normalization. Her project importantly reflects a crip resistance to "delimiting the kinds of bodies and abilities that are acceptable or that will bring about change" (McRuer, 2006, p. 31). This is precisely the charge of "disability hacktivism" that Melanie Yergeau (2014) proposes, calling on crip allies and activists to "cultivate hacking into a disability-positive practice" centered on participatory design. Henry's story, as I situate it within the collective effort to reinstall "girls" as skilled practitioners of technology, reminds us that this movement has yet to fully acknowledge the role of disabled users and crip politics within the legacy of hacking in popular culture and in academic scholarship.

This elision is somewhat surprising considering that feminist cyberfiction, notably, James Tiptree Jr.'s 1973 novella, "The Girl Who Was Plugged In," provided cyberpunk fiction with its iconic image of the hacker, while simultaneously coding an alternate paradigm of hacking rooted in the lived experiences of disability. In her story, Alice B. Sheldon, who began writing under her more familiar alias Tiptree in the late 1960s, provides a contemporary reimagining of telephone switchboard operators, or "hello girls" in the early twentieth century who were debilitated by their work.[3] Writing in 1915, the US Commission on Industrial Relations reported some of these deleterious effects, which the Bell Telephone System subsequently denied. Exposing this cover-up, field investigator Nellie B. Curry detailed the "nervous spasmodic movements" and frequent "nervous collapses at the switchboard" that operators experienced (as cited in Green, p. 79). The adverse mental and physical strains on women's health detailed in these accounts help uncover the disabling effects of switchboard work. These conditions are noticeably absent in archival advertising materials and training pamphlets from Bell Telephone System (later known as AT&T) from the 1930s to 1960s, which reinforced a normative body for the telephone operator. Tiptree's narrative, I argue, redresses the oversight of disability and the exigencies of women's labor in histories of science and technology by highlighting the unseen effects of electronic communication on women's bodies. This critique is rendered through the figure of a disabled female protagonist named Philadelphia Burke (P. Burke), who is selected to

undergo a radical procedure that enables her to remotely operate a beautiful synthetic body named Delphi. P. Burke agrees to "plug in" to the Global Transmissions Corporation's (GTX) network under the premise that, as Delphi, she will become an instant media celebrity. In this future global media economy, GTX is poised to overtake AT&T, yet P. Burke thwarts GTX's information system by hacking her own networked biofeedback.

Asking what this portrayal reveals about the story's historically specific construction of "girls," I examine how this characterization points to Sheldon's misgivings about the rise of digital communication culture and her own disabled and inconspicuously absent female body.[4] In what follows, my reading explores how "The Girl Who Was Plugged In" interlaces the dual histories of telephone switchboard operators and the role of disability in early cybernetics. Placing Tiptree's text in conversation with archival materials from Bell System and early information theory, I show that her portrayal of disability is tied to a cybernetic conception of error and noise as valuable byproducts of a body's encounter with communication devices. Tiptree's narrative, as bears witness to these frictions between users and their machine interfaces, materializes unexamined performances of critical labor and noncompliance that we can link to the emerging field of crip technoscience. Tracking these disruptions in cybernetic feedback across "The Girl Who Was Plugged In" and in historical accounts of the switchboard operator, I argue error and noise underpin an early example of a feminist hacking ethos, and also crip accounts of electronic disembodiment often imputed to cyberpunk fiction and information culture. As manual telephone switching and its design embedded information theory, the vital presence of disability in this system effectively rewrites ableist narratives of the "hello girl" and her switchboard, and the network society they helped usher in.

"Absent Mothers": (Re)Coding Hacker History

Widely fêted by her contemporaries and critics, Tiptree's novella received a Hugo Award in 1974 and influenced a new generation of science fiction writers in the 1980s, including William Gibson, who helped inaugurate the

cyberpunk movement. “The Girl Who Was Plugged In” portends the topoi taken up by Gibson and his cyberpunk brethren, as it explores consumer culture and human-cybernetic systems from a proximate future. Tiptree’s novella, as it participates in the tradition of women’s cyberfiction, also imagines creative and embodied forms of resistance in technological society that reorient existing definitions of the hacker as well as the disabled body.

Feminist theorists offer invaluable analyses of cyberpunk fiction that interrogate how technology mediates women’s bodies and socio-historical constructions of identity (Haraway, 1991; Hayles, 2005; Balsamo, 1996). These scholars offer compelling critiques, and thus provide strategies for reading feminist science fiction (SF) alongside cyberpunk literature.[5] Samuel R. Delany (1994) described feminist SF as an “absent Mother” to cyberpunk; without it, he writes, “there wouldn’t *be* any cyberpunk” (p. 177). Exploring the political consequences of Delany’s claim, Austin Booth (2002) argues women’s cyberfiction “deromanticizes the hacker ethos”: women are better than men at their technical work “but a discriminatory gap (similar to our own) exists between the elite who control the networks and those that are plugged in” (p. 28). These heroines, Booth adds, operate through less sophisticated technologies that mark them as inferior (p. 28). As in other contemporary scholarship, this critique echoes ableist constructions of the technologically enhanced body; that is, through the impetus of supplementation, technological prostheses either transcend one’s given abilities, or render the unenhanced body disabled. These dual portrayals frequently taint the hacker’s representation in cyberpunk literature and in popular discourse.

This rhetoric similarly runs through historiographies of hacker culture, which often conflate two distinct genealogies: one draws on the subculture of youth who delighted in the technical exploration of computer systems through experimentation, and the other on the mass media’s iconization of criminals—or security “crackers”—who hijack corporate and military systems. Commentators of digital culture (Krapp, 2011; Thomas, 2002) are keen to note the original meaning of hacker was sublated into the

populist male fantasy of the outlaw who "jacks in" to the information matrix, which cyberpunk authors and journalists helped disseminate. Cultural critics and technologists have embraced this notion of bodiless transcendence, but this idea is troubling not just because it professes to erase bodies in information culture, but also because it elides intersectional, non-normative bodies that disability and feminist studies scholars have made visible. A closer look at the hacker's original set of liberal values, however, reveals a challenge to this patrilineality and its ableist vision.

In its early beginnings, the hacker was a hobbyist and an idealist who believed in dismantling machines to understand how they worked, and applied this knowledge to create more functional devices and software for the advancement of society (Levy, 1984, p. 7). This philosophy informed the Hacker Ethic, a code of conduct that championed the free sharing of information, decentralization, radical individualism, and a "Hands-On Imperative" to lower barriers to access (p. 40). These principles surprisingly align with feminist practice, supporting what Laura Forlano (2016) calls a "participatory and open form of engagement." Theorizing one manifestation of this practice, Forlano describes hacking as a way of upending the rules of a technological system—its norms of race, class, gender, and sexuality—and producing her own knowledge about her body's attendant technological devices.

This ethos similarly resonates with disability studies and crip theory for its attention to the ways built environments place limits on our (mind)bodies. A commitment to access, both local and physical, animates crip theory's critique of the structural inequalities of spaces (McRuer, 2006). Aimi Hamraie's (2017) historical account of disability activists' guerilla curb-cutting—which remade Berkeley's urban spaces—embodies one instance of this critical agenda. Such an experimental practice, Hamraie argues, represents the rise of crip technoscience, an "anti-assimilationist" stance that "challenge[s] hierarchies and power relations with the field of access-knowledge by shifting expertise to those with lived experiences of disability and away from outside experts often designing in their name" (p. 99). More recently, exploring questions of technological access in computers and

virtual spaces, recent scholarship also illuminates how "digital youth" with disabilities can participate in hacking, tinkering, geeking and making without constraints (Petrick, 2015; Alper, 2014).[6]

This idea can be traced to an earlier instantiation of a "hack" in the 1960s and 1970s with "phone phreaking," a playful manipulation of a complex telecommunications system performed through vocalization. Joe Engressia, who was congenitally blind, and a "gawky, buck-toothed little girl" with a slight speech impediment named Susan Thunder, both altered the operation of AT&T's system using their unique physical characteristics (Hafner & Markoff, 1991, p. 16. Joe's pitch perfect whistle, for example, which imitated the 2600-hertz AT&T signal, gave him a backdoor into telephone operating systems (p. 19). Thunder, on the other hand, was revered for her ability to manipulate people—particularly telephone switchboard operators and technicians—into sharing proprietary passwords, a form of social engineering that mirrored the ingenuity of some early twentieth-century "hello girls." These operators, I will later show, subverted company protocol in ways that prefigure Thunder's legacy. By the time phreakers mechanized these techniques with a blue box, enabling them to freely access AT&T's call centers in the 1980s, they called themselves computer hackers (Hafner & Markoff, 1991; Lapsley, 2013). If the hacker effects a "'return to the origin' whereby the entire discourse of technology is continually reinvented" (Thomas, 2002, p. 61), then phreakers—and their technological foremothers (both real and imagined)—offer a more inclusive account of hacking that productively makes use of embodied knowledge and transgression.

Literary Mediations of Technoscience

In Donna Haraway's "A Cyborg Manifesto" (1991) she speculates, "Perhaps paraplegics and other severely handicapped people can (and sometimes do) have the most intense experiences of complex hybridization with other communication devices" (p. 178). This minor observation—both in the sense that it is left unexplained in Haraway's own text and displaces the

experience of one with a "severe disability" with the "trance state experienced by many computer users" (p. 178)—represents a seemingly endless point of provocation for disability scholars, and is often invoked in emerging conversations on crip technoscience. Alison Kafer (2013) argues that cyborg theory has been misunderstood within both disability and feminist scholarship as promoting an ideology of "wholeness" through a future vision of intervention and normalization rather than social transformation or political action (p. 22). Kafer positions disabled people not as beholden to adaptive technology, but as cyborgs for the way they reimagine interdependence, collective affinities, and networks. "A cyborged disability politics," she writes, offers a necessary theoretical framework for examining how "disabled people are positioned in terms of efficiency, productivity, and ability to work, or lack thereof" (p. 119). Among disability scholars (Ott, 2002; Serlin, 2004; Orr, 2006; Alper, 2014; Petrick, 2015; Hamraie, 2017) who bring this critical lens to science and technology studies, Jonathan Sterne (2003) and Mara Mills (2011) have shown how deafness was integral to the development of sound reproduction technologies and the telephone. In the context of this study's focus on modern telecommunications, of particular interest is Mills's work, which documents Helen Keller's and deaf electronic engineers' contributions to communication engineering in early twentieth-century telephony. Though Mills establishes how noise and deafness shaped the telecommunications industry, there is another, parallel narrative about how feedback error and disability informed the origins of information theory.

This account is surprisingly preserved within contemporary fiction like Tiptree's, suggesting that literature gives testimony to previously untold histories of disability in technoscience. Tracking the complex entanglements between bodies and texts alongside different media, my approach is informed jointly by Mills and Sterne's (2017) "dismediation," a comparative methodology that studies disability's centrality to media histories, and Katherine N. Hayles's (2005) concept of "intermediation" (p. 7). As literature registers "the impact of information in its materiality" (p. 7) contemporary fiction—especially cyberpunk and its feminist SF antecedent—becomes a

valuable resource for giving voice to the often-silenced subjectivities that get written out of cultural histories of machine systems. This impetus to bring the unseen and unheard to light underpins the metanarrative conceit of "The Girl Who Was Plugged In."

This conceit is introduced at the story's outset, when an unnamed narrator commands the reader to "Listen, zombie" (p. 43), colloquially naming the reader as an auditor in a telephone system. Later acknowledged to be a minor character who works for GTX, this "sharp sneering operator's voice telling about the future," wrote Tiptree to editor Damon Knight in June 1969, hints at her interest in the switchboard operator. This interpellation, I argue, calls upon the audience to remember the unseen extensions we once communicated through: the erasure of Sheldon's body through her pseudonym and the narrators' masculine voice; the forgotten bodies of telephone switchboard operators; even the deaf maternal body that helped produce the telephone (Sterne, 2003). In the discussion that follows, I offer an entry point for reading Tiptree's novella through a crip/disability studies lens, looking at P. Burke's narrative representation and the ways the story's language and its imagined cybertechnologies uphold and simultaneously dismantle the social model of disability.

Cripping the Terminal Subject

Though the telephone seemingly erases the visible markers of users' bodies—working from the cybernetic principle that information must be extracted from its medium to be transmitted—"The Girl Who Was Plugged In" actively resists this disembodied understanding of telephony. The narrator ironically counters his aural command with "Look…see that rotten girl?" (p. 43). "The funky girl on the streets" stands on the fringes of a crowd of spectators who throng around a group of beautiful celebrities (p. 43). Jostled against the narrow walkway, Burke presents a striking contrast to the subjects of her admiration: "you can now see she's the ugly of the world. A tall monument to pituitary dystrophy. No surgeon would touch her. When

she smiles, her jaw—it's half purple—almost bites her left eye out" (p. 44). From the narrator's vantage point, we are treated to glimpses of "her jumbled torso, her mismatched legs" (p. 44). This striking depiction of Burke fits the model of what disability scholar Rosemarie Garland-Thomson (1997) calls "an extraordinary body" that is essential to cultural constructions of the norm and conventions of narrative representation (p. 5). Burke's exaggerated physical characteristics foreground the way disability becomes an emblem of difference in a patriarchal society that values order, aesthetic conformity, and coherence. At the same time, this description of P. Burke situates her body as a product of social relations, attitudes, and built environments. It invokes social constructionism, a paradigm disability scholars developed to counter the medical model, which pathologizes disability as a condition to be cured, treated, or institutionally controlled.[7] Put another way, the social model advocates for disability as a cultural invention rather than a biological deficit. The narrator's language here, though it draws attention to P. Burke as a site of spectacular aberrancy both in her physical otherness and ugliness, carefully places the protagonist within a space that marks her as such. The "sharp-faced lad" knowingly hints at the way Burke's body is *re*-presented and denigrated through social power structures such as celebrity culture and media consumption. This interpretation gains credence when we read this moment alongside other representations of P. Burke's body that appear later in the text.

In addition to providing a new lens for literary and feminist scholars to read Tiptree's work, a disability studies critique of P. Burke has important implications for the story's visionary portrait of the terminal subject it lends to cyberpunk fiction. To date, Tiptree's critics have understood P. Burke as "an extravagant staging of an entirely distasteful version of female embodiment" in which bodies are devalued in a postindustrial system (Hicks, 1996, p. 70), or as a bitter caricature of "the body in a state of putrescence" (Bukatman, 1993, p. 317). Hayles (2005) offers a slightly more optimistic appraisal, referring to P. Burke as a "distributed subject" in an information system that manifests the limits of female participation in a capitalist society (p. 81). Within these interpretative frameworks, Burke's

abject body conjures the cyberpunk hacker's nightmare of his own loathsome flesh. Such judgments rely on a flawed logic that stigmatizes disability and parses non-normative female bodies as disabled. Even Sheldon's biographer, Julie Phillips (2006), citing evidence that Sheldon struggled with chronic depression and various physical aliments, maintains that "The Girl Who Was Plugged In" is a parable of Sheldon's antipathy for her progressively deteriorating physical state in real life. Sheldon's lifelong use of Dexedrine—a drug also used to treat ADHD—intensified her uneasy relationship with her own body, an addiction Sheldon confided in her letters was fueled by an increasing resistance to "*being* my body…although I know perfectly well that I am it and it is me" (as cited in Phillips, 2006, p. 260). Phillips's reading, which is heavily favored by literary critics, does not fully explain the role of information technology in the story, or consider how social discourse might create a compulsory female and abled-body. Sheldon (1975) excoriated the cultural norms of femininity at various points in her career, but it is worth noting that she understood this compulsory body that "no women escapes" as a product of "being told that 'Girls' can't do this or that" (p. 2). A woman's abilities, by Sheldon's rationale, was prescribed by her social environment and configurations of knowledge/power.

The robust presence of physical disability in the narrative, and its fluid and at times contradictory constructions, suggest that Burke articulates a more complex model of disability born out of Sheldon's feminist critique. Elsewhere in the story, Burke is characterized as an inhuman "cast-up, a pumped-out hulk" (p. 46), a "girl-brute" (p. 46), a "rancid girl-body" (p. 47), a "grim carcass" (p. 55), an "ill-shaped thing" (p. 58), and even a "she-golem" (p. 76). Such aesthetic qualifiers seem to reproduce the visual rhetoric of disgust and freakery projected upon disabled bodies within some cultural settings, as Garland-Thomson (1997) has shown. Yet these appellations continue to follow P. Burke even after she is integrated with her technological apparatus. When Burke is relocated from an above-ground location in her naturalized state, to an underground laboratory from which she operates Delphi sight unseen, both GTX's and the narrator's attempt to jettison her body fail spectacularly. The persistence of these abject

characteristics suggests that P. Burke visibly shuns the "cure" narrative that cyborg technologies may impose on the disabled body.[8] To further complicate this reading, one might note how these signifiers depart from Burke's initial representation as an assemblage of body parts, instead working to evacuate her body of specific identifying characteristics that might be medically pathologized. That is, in calling Burke a "she-golem" or an "ill-shaped thing," the narrator invokes gender and disability as a process of endless remaking, becoming, and knowing, a crip feminist onto-epistemology that exposes the limits of linguistic representation.[9] Put another way, this descriptive catalog "talks back to able-bodied terms," as crip theorist Robert McRuer (2006) would say, implying that "crips cannot be contained; even the words most intended to keep disability in its place" (p. 40). Even assimilationist cyborg systems cannot contain crips, as the progressive unintelligibility of P. Burke's body foreshadows.

Though corporeal materialism and embodied ways of knowing are some of the principal arguments of feminist technoscience (Haraway, 1991; Balsalmo, 1996; Kafer, 2013), these values demand further revision as they presume an able-bodied phenomenology. Read this way, P. Burke contravenes Haraway's example of another fictional female cyborg character from Anne McCaffrey's *The Ship Who Sang*, whom she describes as a "severely handicapped child." In this story, Helva's brain is removed and her body is discarded, transforming her into a class of "shell-people" whose brains are implanted into spaceships. In her critique of "A Cyborg Manifesto," Kafer (2013) explains how Haraway's use of Helva to illustrate cyborgian boundary-blurring "echoes longstanding ableist assumptions about the uselessness of physically disabled bodies and the necessity of a technological fix" (p. 112). A non-ableist cyborg politics, Kafer proposes, is rooted in a more ambivalent relationship with technology (p. 119). "The Girl Who Was Plugged In" responds to this call as it remains committed to the lived experience of Burke within her human-machine system. Choosing instead "to explore the creation of such categories and the moments in which they fail to hold" (p. 10), as Kafer's political/relational model recommends, the story enacts a site for witnessing the blurring of human

and technology. In so doing, Tiptree's narrative recognizes "such moments of excess or failure [as] key to imagining disability, and disability futures [and, I would add, histories], differently" (p. 10).

Bell System's "Ideologies of Ability" and Switchboard Operators

By the story's publication date in 1973, telephone operators had long departed from the method of manually connecting calls through a switchboard, rendered obsolete by automatic telephone switches.[10] Though Tiptree (1969) never acknowledged this specific transformation, she explicitly stated in her letter to editor Damon Knight—who later rejected the story—that the novella was a critique of "current trends in monopoly of communications," citing GTX as an "extrapolation" of this trend "if you merge, say, AT&T, the networks, and the aerospace industry" (p. 2).[11] As the lifeblood of the telephone system, the switchboard operator best epitomized the human toll AT&T's rapid expansion had on its workforce.

Following the introduction of the first telephone switchboard in 1878, the American Telephone and Telegraph Company (AT&T), formerly known as the Bell Telephone Company, began hiring "girl operators (typically between 17 and 26 years old, according to industry guidelines)" because they were thought to be "naturally more patient, polite and 'amenable to discipline'" (Middeljans, 2010, p. 39).[12] These operators were ostensibly "girls" by dint of their age, demeanor, and marital status."[13] "Ma Bell," as the Bell System was known, initially only hired young women who fit a distinct set of physical guidelines, rejecting minorities, people with disabilities, and women who were deemed unattractive. Read alongside a gendered history of communication technology, Tiptree's girls reveal new possibilities for critical interpretation, demonstrating how the switchboard privileges and excludes specific bodies. As the *Bell Telephone Quarterly* explains, "essential qualifications" for telephone girls included "intelligence, health, sight, hearing, voice, size, temperament, character, appearance, and previous record" (LaChance, 1931, p. 13). The *Quarterly* neglects to mention that staff physicians conducted pre-employment screening

examinations, a practice inaugurated in 1913 under AT&T's Employee Benefit Plan. The emergence of Bell System's medical department—notably run by men—coincided with this plan, which oversaw sickness and disability benefits, and helped maintain the ideal of its girls: middle-class, single, hardworking, docile, and, perhaps most importantly, intellectually and physically "able" women.

There were other ways AT&T sought to normalize its core workforce's bodies. Though the barriers to entry-level switchboard work were already high for aspiring telephone girls, a General Personnel Board report suggests that AT&T persisted in its corporeal surveillance over new operators: "many of the girls with minor defects, such as poor teeth, undernourishment, defective vision, overweight [sic], colds, etc." might more readily be induced to "correct" or prevent these physical ailments after a Health Talk (as cited in Cooper, 1997, p. 492). Attributing poor health among operators as "the fault of the young women themselves," physicians implemented the Health Talk as part of the operator's training program in the 1920s in response to high turnover rates due to illness (one out of three operators remained after a year on the job) (p. 492). If we respond to Mills's (2011) invitation to "read" communication machines and their histories as devices with defined physiological parameters, then, the telephone switchboard similarly stages an "unavoidabl[e] encounter [with] the material interfaces of communication, and the ways media systems incorporate bodies of users" (p. 81). Through its sanguine corporate discourse and medical assessments, AT&T fastidiously preserved these norms. Such practices inscribe what Elizabeth Ellcessor (2016) calls a "preferred user position" that reinforces "ideologies of ability" and devalues disability (p. 69). Yet the switchboard, as I will show, undermined these corporate tactics by constraining female embodiment in ways that might be understood as disabling.

As the demands for operators increased, the training itself became more regimented. Switchboard operators were trained to be a "human machine, the exponent of speed and courtesy" (Middeljans, 2010, p. 42). They endured intensive drills to locate switchboard lines, interpret faint or

distorted speech patterns, and to push plugs into answering jacks hundreds of times an hour (Maddox, 1977, p. 271). In turn, certain gestures, behaviors, and physical idiosyncrasies such as foreign accents or poor eyesight were not coded into switchboard operation. These standardizations represent a continuation of AT&T's commitment to industrial efficiency in regulating the telephone's signal and noise. Following Karin Bijsterveld, Mills (2011) explains how telecommunications companies like AT&T helped introduce the idea of noise as "determined by the capacity of a system and the susceptibility of its receiver to information loss, or deafening," thereby pathologizing noise as a defective mode of communication (pp. 123-124). This inference was surprisingly cultivated through collaboration between telephone engineers and people with hearing loss, even as it sought to erase those whose ears fell outside the "normal" threshold (p. 122). Like other communication devices, the switchboard is an artifact of information theory that "prioritized certain kinds and arrangements of bodies above and beyond the sheer isolation or transfer of information" (p. 82). Women workers who deviated from Bell System's productivity standards—from rates of calls connected to acceptable operator decorum—were sent for remedial training, or at worst, were taken off line.

The Girls Who Were "Plugged In"

An evocative trope, "plugging in" explains how female bodies were incorporated into (and even unincorporated) from telecommunications systems. In the story's opening sequence, P. Burke is fully "transistorized" after a series of surgical modifications that leave her looking—"if possible, worse than before"—with "electrode jacks peeping out of her sparse hair, and there are other meldings of flesh and metal" (p. 47).[14] These connective devices allow her to plug into Delphi, a genetically engineered "waldo" without a brain that can be remotely manipulated.[15] With her extruded nervous system, Burke syncs her afferent perceptions with Delphi through GTX's communication network. The brain-child of advertising executives,

Delphi is by all appearances a fifteen-year-old girl whose glamorous lifestyle is in fact an elaborate ruse of product placement for GTX. Burke's real body remains hidden underground in a warehouse where her physiological responses are carefully monitored by a team of male technicians. This enclosure is significant insofar as it reimagines AT&T's techno-labor system where telephone operators were wired to a series of hulking, wall-length machines, with hawk-eyed managers peering over their shoulders and male physicians overseeing the health of female employees, while their "voice(s) with a smile" traveled over the wires (as cited in Middlejans, 41).

The intractable logic of "plugging in"—in which one is simultaneously a controller and conduit for information transmission—dictates how human operators work alongside their machines. Just as the telephone girls of the Bell System underwent rigorous training in preparation for manual switching, GTX requires Burke to perform a similar degree of competence:

> The training takes place in her suite and is exactly what you'd call a charm course. How to walk, sit, eat, speak, blow her nose, how to stumble, to urinate, to hiccup—DELICIOUSLY…As the man said, it's hard work. But P. Burke proves apt. Somewhere in that horrible body is a gazelle, a houri, who would have been buried forever without this crazy chance…Only it isn't precisely P. Burke who's stepping, laughing, shaking out her shining hair. How could it be? P. Burke is doing it all right, but she's doing it through something. (p. 47)

While the narrator ridicules P. Burke's training, these embodied actions reflect the telephone operator's drills in vocal inflection, posture, and hand gestures. Though seemingly trivial, such prerequisites were viewed as cornerstones of the switchboard operator's skillset up through the mid-twentieth century. Telephone operators worked in pairs during their training (Clark, 1950, p. 121). Burke, too, also learns through her double: she is, after all, "doing it through something." As the details of her training emerge, Burke's exceptional performance slowly erodes the narrative's initial emphasis on her disabilities. This particular scene underscores the physical work and display of technological virtuosity Burke enacts as a "Remote" esteemed for her "terrific aptitude" (p. 58), and foreshadows how later, she

will use this mastery to disrupt GTX's own information system.

Figure 1. Bell Telephone System advertisement, 1935.

Figure 2. AT&T advertisement, 1933.

The vision GTX has for P. Burke and her exquisite double eerily resonates with the Bell System's idealization of telephone girls. Championing the "weavers of speech" in the early twentieth century who "sit silently at the switchboards, swiftly and skillfully interlacing the cords [that] guide human voices over the country in all directions" ("Weavers," 1915), Bell System extolled the switchboard operator. While P. Burke has been described in no less than abhorrent terms thus far, the narrative suggests that as a cybersystem she is a superlative model. Fittingly, this sentiment is expressed through Joe, P. Burke's console operator, who considers her "system matrices" to be "beautiful" (p. 48). Bell System similarly romanticized the human-machine interface as a cybernetic system of control, communication, and above all, efficiency. Emphasizing the operator's enclosure within the switchboard room, the advertisement above (Figure 1) illustrates how the operator's sensory perceptions were folded into and co-determined by these devices. She is, as another print ad paints imaginatively, a terminal node in a global network (Figure 2). With the world at her fingertips, calling-cords radiating from her torso and hand, this image of the switchboard operator constitutes an extraordinary literalization of plugging in. Yet, even as she is picturesquely drawn within Bell System's idealistic ethos, this operator—with her back to the viewer—is an anonymous figure. The 1935 campaign (Figure 1), in contrast, overtly commercializes the operator's friendly countenance to humanize its system. Read side by side, these advertisements show how women operators helped realize AT&T's vision of a global communication network. Popular images of women "participating in the sound-reproduction network" were not metaphoric but literal, as Sterne (2003) notes, and highlight the role they played in emerging telephonic systems (p. 228).

"The Girl Who Was Plugged In" similarly exposes the dual, often conflicting portrayals of telephone operators. Burke's work encodes a process the story's narrator analogizes to switchboard routing: "The next time she plugs in to open Delphi's eyes it's no different—do you notice which relay boards your phone calls go through?" (p. 56). The narrator remarks

how, as contemporary observers, readers fail to discern "the relay boards," or telephone girls through which our calls are transmitted. This crucial moment reveals the conceit behind the girls who were plugged in, forging a powerful connection between P. Burke and Bell System's anonymous switchboard operator. Burke may be the invisible operator as we see with the faceless figure, and Delphi her fictional ideal as the popular "hello girl" Bell System often invoked. The narrator's jibe thus offers a course correction to Bell System's ableist rhetoric and commercial imagery, calling out the hypocrisy of its exploitative practices and extreme vigilance over operators' feminine aesthetics and abilities.

Crip Strategies within the "Integrated Circuit": Noise and Error

Burke and Delphi, subject to GTX's "real-time response-sensor readouts from every receiver in the world" (p. 61), depict cautionary models of the way information systems control women's bodies. Haraway's (1991) concept of the "integrated circuit" is applicable here: it highlights the consequences women and others experience when their bodies are "dispersed and interfaced in nearly infinite, polymorphous ways" within digital networks (p. 163). The "integrated circuit" in Haraway's manifesto refers specifically to information networks that exploit women, especially third-world laborers who toil in electronics-dependent jobs. Without overlooking this important cultural history, I argue this conceit can also be used to describe the work of switchboard operators in North America. Like GTX, AT&T systematically integrated operators into their global system without consideration for women's biological well-being. Earlier, I discussed Bell System's extreme vigilance over operators' appearances and health, yet such practices highlight the horrors of ableism in the real world, just as Tiptree does by writing of the rotting flesh of Burke made immobile by her long hours of interfacing with Delphi. The operator thus exemplifies one overlooked example of how "cybertechnologies rely on disabling labor practices across the globe" (Kafer, 2013, p. 118). In spite of AT&T's later efforts to ameliorate these effects through sickness and disability benefits

and more regimented training, debility and human error became common side effects of switchboard work.

For this reason, the telephone operator presents a surprising point of concurrence for disability studies, media studies, and feminist technoscience. An investigation by the US Commission on Industrial Relations (1915) found the working conditions of telephone operators to be "subject to grave criticism," and the "nervous strain incident to the service are so very severe" (p. 106) that physicians observed a high incidence of mental and physical collapses among operators. The repetitive strains of switchboard operation and "the perpetual jumping up and down and stretching" to plug in cords, Brenda Maddox (1977) maintains, often became debilitating (p. 269). A report by Ethelbert Stewart, an agent for the Secretary of Labor and Commerce, found the actions required by telephone switching to cause spinal curvature and prodigious strain on the nervous system (Cooper, 1997, p. 494). These combined symptoms became so closely associated with telephone switching that they became known as "telephone shock" (p. 495). Even by the late twentieth century after the introduction of automatic switching and video terminals, operators faced workplace hazards such as eyestrain, carpal tunnel syndrome, miscarriages, and other mental health stresses (Green, 2001, p. 219). These counter-narratives expose the damaging effects of manual switching on women. Such atrocities are called into account with the figure of Delphi, who embodies the paradox of AT&T's unattainable bodily norms for its operators.

Suffering the stresses of their respective cybersystems, Burke and Delphi demonstrate the switchboard's remediation of physical ability and health. Earlier, I proposed that Burke's disability grounds her body's physical presence in an information system. Yet disability becomes more fluid in Delphi, who as an extended nervous system or "prosthesis" for Burke, recursively mirrors her disability and deteriorating health. Famously defining media as "extensions," among which the telephone network was included, Marshall McLuhan (1964) warned that technological prostheses put American citizens at risk of "narcosis," or "autoamputation" (p. 45).

Under McLuhan's rubric, media produced new sensory ratios to the detriment of some senses, and to the benefit of others. This sensory reconfiguration is mapped onto the story's characters: while Delphi endures the loss of sensation in exchange for her global travels, P. Burke on the other hand falls ill with "necroses under her grisly sit-down" from her prolonged immobility (p. 58). These experiences point to the myriad, and often conflicting technological conditions in which disability is situated. This crucial detail redefines disability as the product of encounters and actions between interdependent bodies and technological networks, bridging Kafer's political/relational model and crip technoscience.

The tangible effects of GTX's system on P. Burke further manifest when she begins to realize there are discrepancies in her ability to perceive touch through Delphi. This oversight is intentionally built into the system's design: GTX engineers bypassed sensory information such as taste, smell, and touch due to limited network bandwidth. Burke is particularly grieved to discover her lack of tactility during her budding romantic relationship with her paramour, Paul. GTX's brash neglect of P. Burke's functional needs results in its user's disclosure of increasing technological ambivalence. As a cyborg, Burke's relationship to her interface is anything but a well-integrated, smooth circuit; she "holds in tension the need for access or function with frictions, limitations and failures inherent in the technoscientific design process" (Hamraie, 2017, p. 107). In one of the story's more poignant moments, readers get a rare glimpse into P. Burke's subjectivity as she tries "over twenty-double-thousand miles of hard vacuum to reach her beloved through the girl—flesh numbed by an invisible film…to love him back with a body that goes dead in the heart of the fire" (p. 68). These episodes of sensory disjunction emphasize the difference between Delphi and her own body: "she's slow about discovering there's certain definite places where her beastly P. Burke body *feels* things that Delphi's dainty flesh does not" (p. 55).

The failures of sensory fidelity experienced by P. Burke are what cybernetic parlance calls "noise," or distortions in information feedback. Noise is often defined as the signal's opposite, that which threatens the

order of a system; the narrative's focus, however, suggests that noise is a result of an imbalanced ratio input-output. When communication breaks down, as it does between Delphi and Burke, this failure confers a space "to recognize the difference between self and other" (Haraway, 1991, p. 164). This space of recognition exemplifies Haraway's feminist cyborg politics because it privileges noise over perfect communication (p. 176). As a company that values having "things orderly, especially their communication," noise is GTX's greatest adversary, for "their nightmares are about hemorrhages of information; channels screwed up…garble creeping in" (p. 45). Noise is not simply inevitable in cybernetic systems that incorporate human agents as part of its operational interface, as Bell System's management against human error illustrates. Noise, if we follow media historian Peter Krapp's definition, also allows the system in Burke's hands to learn and make *room* for error (2011, p. 92) as she explores the limits of her two bodies.

In *Cybernetics*, Norbert Wiener (1948) analogized learning to the process of automatic telephone switching: humans and machines could adjust their behaviors, or outputs, through information feedback. Wiener's theory of control and communication took shape through his research with subjects who had neurological and motor disorders, a study he details in his chapter "Feedback and Oscillation." Wiener was interested in these disabilities—among others like deafness and amputation (Mills, 2011; Serlin, 2004)—as physical manifestations of the body's performance as a cybernetic feedback system. His observation of error as an essential component of information feedback and machine behavior was not intended purely as an engineering fix; it helped him understand the inherent messiness of communication. Rather than theorizing "human fallibility [as] what keeps systems from achieving their full potential," as Krapp (2011) suggests, through noise, "people, citizens, and individuals in fact become realized for each other and for themselves in unprecedented ways through networks of computer-mediated communication" (p. 91). To extend Krapp's idea further, if we conceptualize cybernetic error from a queer and crip theory standpoint as a kind of failure of compliance between users and

systems, a more inclusive picture emerges. Within this framework, I propose error and noise can be understood as a form of critique that "recognizes that alternatives are embedded already in the dominant" (Halberstam, 2011, p. 88). That is, information loss and communication failure are resources for new ways of knowing disability, and thus become instruments of crip technoscience.

The uncanny concurrence between the way disabled bodies haunt Wiener's cybernetic conceptions of noise, telephone switchboard systems, and GTX's media network, provides a flashpoint for rethinking crip theory. In the same way that error and noise express the material frictions of a system, they also continually insist in the same way that crip theory does that "such a system is never as good as it gets" (McRuer, 2006, p. 32). As disability scholar Jay Dolmage (2007) explains, "to crip is to expose and reproduce disjunction, to refuse order and embrace messiness" (p. 849). One could easily substitute error and noise into this equation: like "cripping," error and noise also reproduce disjunction and refuse order. This comparison is imperfect (the conditions of error and cripping are unique), but it helps us see the cross-pollination between cybernetics and crip theory, and how affordances for unruly bodies or partial communication are encoded—and even preserved—in cybernetic systems. Noise and error too, in Tiptree's hands and in AT&T's rhetoric, expose how information theory is falsely predicated on an able body. Equally as important, in the hands of skilled users error and noise can be co-opted as a crip technique, a practice of identifying alternative points of access in a network. This critique is perhaps one of the story's most significant contributions as a feminist SF text, recognizing the subversive power of disability within communication systems.

Towards a Crip Feminist Hacker Ethic

In this final section, I explore how Burke's experience of noise—the corruption of her sensory feedback—becomes useful insofar as it reveals the inaccessibility of GTX's system, and compels her to hack Delphi. "The

Girl Who Was Plugged In" reimagines error as a crip strategy of resistance against the rhetoric and practice of control within the "integrated circuit." Error similarly becomes an alternate ideology of technological mastery and disobedience in Laura Forlano's (2016) "Hacking the Feminist Disabled Body," an ethnographic account of living with Type 1 diabetes with an insulin pump and a continuous glucose monitor. She writes, "it is only through my own body's failure and breakdown that I have come to participate in and redefine the socio-technical practices that constitute hacking." As such, she introduces a crip feminist hacker ethic in which her disability is reconceptualized as the "everyday rituals" of her glucose monitor's glitches, and hacking as "the invisible labor [that] contributes to its maintenance and repair." Though Forlano's feminist hacker ethic situates her body within a network of medical devices and quantification, her claim that participation is defined by "inherent frictions, failures, limitations, breakdowns and interruptions" can be more broadly used to describe human-machine interaction within networked communication systems. This articulation not only draws a link between disability and rituals of error that Wiener observed in cybernetic feedback and in my account of AT&T switchboard operators, but also characterizes P. Burke and Delphi's electronic connection.

Toward the novella's end, Burke discovers how to surpass the boundaries of GTX's system. Her connection with Delphi—in spite of the tactile inconsistencies—is so strong that her prosthetic half begins to exhibit its own autonomy when unplugged. Now and again in the narrative, unbeknownst to even P. Burke, Delphi "all by herself smiles a bit or stirs in her 'sleep'" (p. 60). Once, she "breathed a sound: 'Yes'" (p. 60). Such acts are all the more remarkable, the narrator claims, because Delphi is disconnected from Burke. These indiscretions foreshadow Delphi's increasingly powerful expressions of individual subjectivity, and as technical impossibilities, these actions pose a real problem for GTX. Viewing these irregularities as symptomatic of a nervous breakdown and a potential massive system error, the corporation resorts to disciplining Delphi's body through electric shocks. Her neural system disarmed, a convulsive Delphi now, too, becomes marked as inhuman. This conundrum is dramatized in

the narrative's final moments when Paul, believing that Delphi can be freed from her "electronic shackles" (p. 70), escorts her back to GTX's facilities for medical assistance. In doing so, he confronts Burke for the first time. No longer concealed by her interface, Burke hopes Paul will reciprocate her feelings when she moves to embrace him. As she does, Paul accidentally knocks her wired nervous system askew, killing her in the process. Burke's termination seems to circle back to the narrator's deep-seated cynicism, mocking the reader's expectations that Burke's love for Paul can transcend her imperfect body. Though scholars have read this narrative resolution as foreshadowing cyberpunk's rejection of the body, we might instead view Burke's terminal disconnection as consistent with the crip instrumentalization of error. Her noncompliance is a form of antiproduction in the sense of queer failure: she wields it an oppositional tool that "turns on the impossible, the improbable, the unlikely," imagining other ways of being (Halberstam, 2011, p. 88). This failure reroutes us into another way of reading Burke's death: as a transgressive act against GTX's circuit.

In spite of being disconnected from Burke by the story's conclusion, Delphi persists, remaining animated: placing "one foot before the other, not moving very well—but moving" (p. 76). In this brief moment, Delphi hacks her own cybersystem, and by correlation, GTX's network. Her display of physical agency enables Delphi to claim her liberation from GTX's "integrated circuit" through a powerful speech-act: "I'm Delphi" (p. 77). Her rebellion against GTX is not without precedent: telephone operators, as April Middeljans (2010) notes, used the power of the switchboard to "regulate society and engineer their own lives," subverting cultural codes and corporate regulations out of their own sense of moral duty (p. 39). Operators admitted they routinely resisted Bell System's regime of efficiency by scrambling connections and redistributing nickels by taking them from rude callers (p. 41). In rare cases, they gave friends access to other callers' private conversations ("Diary," 1907, 30), playfully rewriting the system's rules to enable free access to information. Although Delphi is for all intents and purposes electronically untethered or "TURNED OFF" (p. 60), she similarly challenges GTX's system from this position. Delphi, along with

Burke, doesn't perpetrate this insurgency by hacking a corporate firewall in cyberspace, or by navigating computer programs to steal money and information. On the contrary, P. Burke and Delphi hack their electronically networked nervous systems so that they might feel *more* human in their wired-up world. They situate the hacker within a social space rather than the pure space of data in order to make GTX's system more accommodating to other bodies that operate according to their own idiosyncratic rules. Their performance of user-motivated design embodies what Yergeau (2014) calls a "criptastic version of hacking" that is disabled-led and process-based, focusing on rewriting the rules of access rather than a finished product or software.

This portrayal implicitly performs a broader commentary about contemporary technoculture whereby Burke seemingly exemplifies but ultimately fails to live up to the metonymy of plugged-in bodies as disabled bodies. For example, in depicting Burke as a "paraplegic," and later, as a "blind mole-woman" buried underground, the narrator aligns her portrayal with her interface and the way it physically suspends her body (pp. 64, 67). In these moments, Burke ostensibly allegorizes what Paul Virilio (1993) describes as "the growing inertia" of bodies wrought by the telecommunications industry, in which the "plugged-in human being" functionally becomes a "well-equipped invalid" (pp. 11, 4). Virilio views the individual's loss of natural mobility for a greater degree of control in an information network as an untenable exchange. But this conception merely rehearses the myth of the disabled cyborg, as Kafer (2013) would point out. By shifting the definitions of wholeness and "validity" toward access—which privileges hacking as form of movement (Yergeau, 2014), albeit perhaps imperfect or incomplete—Tiptree's girls provide a rejoinder to Virilio's argument. They introduce a non-ableist, crip understanding of technoculture that untethers information control and navigation from physical mobility or cognitive aptitude.

These terminal subjects, I argue, represent a crystalline example of how technological systems remediate ability, thus redressing ableist ideas about how humans operate and work within their electronic networks. As a

failure not *of* the body, but of prescriptive top-down systems *designed to contain* bodies, error announces the fallacy of smooth integration, whether it be a cyborg system or a switchboard network. Through the medium of the story's imaginary future, Tiptree makes this recognition possible by effectively reinserting telephone girls back into a history of communication technologies that registers information in its noisy materiality. We not only see the material effects of technology on the female information worker's body in cyberpunk fiction, but also how the same laborer can short-circuit this conduit through her embodied knowledge of the system.[16] The girls who plug in—and their coalitions of women who plug into insulin pumps, breathing machines, wheelchair battery chargers, cochlear implants (as does this author), and the like—offer enticing possibilities for how we might rewrite and crip hacker futures.

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Notes

[1] See also, M. Hicks (2017).

[2] Henry's project echoes the work of Ida Brinkman and other "electric moms"—women with disabilities in the postwar era, who, as Bess Williamson (2012) has shown, adapted medical and assistive equipment to move beyond the home and medical treatments of disability. Sara Hendren and Caitrin Lynch's (2016) Engineering at Home similarly celebrates one woman's engineering hacks derived from repurposing "unlikely things" such as cable ties and wall hooks; Hendren and Lynch's project exemplifies contemporary instances of user-centered design.

[3] In the mid-1970s before she was unmasked as a women writer, Sheldon began writing as Raccoona Sheldon to tackle themes outside of Tiptree's

"masculine" purview.

[4] When discussing Sheldon's written work published under her pseudonym, I will refer to her as James Tiptree Jr., otherwise, Alice Sheldon will be used in personal contexts.

[5] For other feminist technoscience critiques, see Balsamo (1996), Vint (2007), and Stone (1991).

[6] Accessible Tech in Employment Hackathon, and DIYAbility, which invite people with disabilities to develop solutions to barriers in access, contravene ableist approaches advocated by non-profit companies such as Hacking Autism or MIT's ATHack, which views disability as a "challenge" to be "solved." See Yergeau's (2014) critique of the hackathon's charity-driven ideologies, though she cautions against fully ascribing these principles to conceptions of hacking.

[7] See Siebers (2011) on social constructionism in disability studies.

[8] See Allan (2013) for further study of SF's treatment of disability.

[9] Following Kelly Fritsch's (2015) explanation of disability as a material practice of knowing, a crip feminist onto-epistemology appropriates the discursive and material practices of representing disability to reroute the power relations that constitute this body.

[10] Bell Telephone began incorporating automatic telephone switches in 1915. These were ubiquitous by 1972, signaling Bell System's transition to a "cyber-mechanical-human endeavor: a mix of operators and machines" (Lapsley, 2013, p. 26). Early switchboards were a primitive collage of metal and wood, but by 1903, roughly 3 million switchboard connected phones. Behind these lines were warehouses of human beings who manually switched calls (p. 24). By the late nineteenth century, switchboards became more complex, and electrical cords connected to "cordboards" enabled operators to connect calls more quickly.

[11] Tiptree lived to see the divestiture of Bell System in 1983, though it was one year after the publication of "The Girl" in 1973 that the US Department of Justice filed its antitrust suit against the company.

[12] Though the first switchboard operators were boys, they were quickly replaced by women (Lapsley, 2013, p. 21).

[13] See Grier (2005) for a similar categorization of female labor, when "computers became 'girls'" (p. 276) as they tabulated numbers for wartime research projects. Grier suggests that "girls" became an expansive term that included those with racial, religious, socioeconomic, and physical differences, "joined by African Americans, Jews, the Irish, the handicapped, and the merely poor" (p. 276).

[14] In spite of Haraway's claim that cyborgs have "no truck with gender," there is a long line of female cyborgs in science fiction. See Flanagan and Booth (2003) for a more extensive catalog of cyborgs in women's cyberfiction.

[15] First mentioned in Robert Heinlein's (1942/1999) story of the same name, a "waldo" is an industrial lathe that synchronizes the gestures of two bodies across space through sensory input and output. Heinlein's story also imagined the "waldo" as a prosthetic extension of a disabled body.

[16] See other disabled cyberpunk female hackers such as Lise in William Gibson's "The Winter Market" (1986). Sam in Pat Cadigan's *Synners* (1986/1991) hacks computer networks through a modded insulin-pump chip reader connected to her belly.

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Bio

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