way individuals and groups can expect to navigate the social world. In the concrete effects of stigma, we see the afterlife of its origins as both a punishment and a technique of identification. Stigma is sticky, and it has the power to confer identity; it is general, but it attaches to particular individuals; once one is marked with stigma, it may be difficult to escape its hold.

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# Technology

Mara Mills

The definition of technology has been the subject of considerable philosophical debate. Technology was a relatively denigrated topic in Western philosophy until the early modern period, as a result of the unfavorable distinctions—dating to ancient Greece—between *techne* (craft knowledge) and *epistēmē* (theory or science). "Technology" most commonly refers to manufactured things: artifacts, handiwork, devices, and machinery (Kline 1985, 215). The term "biotechnology," coined in the twentieth century, refers to the manufacture or gainful modification of organisms, tissues, and life processes. Examples of biotechnology range from plant breeding to genetic engineering. Some scholars broaden the category of technology to include technics: technical skills, methods, and routines. More broadly still, others consider technologies to be "sociotechnical systems of use," defined by Stephen Kline as "combinations of hardware and people" brought into being "to accomplish tasks that humans cannot perform without such systems—to extend human capacities" (1985, 216).

Until recently, technology has been the subject of forceful critique rather than sustained analysis in the field of disability studies. According to the social model of disability, the lack of access to technological systems, especially those required for the performance of citizenship—from workplace architecture to municipal infrastructure to telecommunications networks—is a principal source of disability. The notion of technology



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as an "extension" of generalized "human capacities" has given rise to speculation about the intrinsic relationship of technology to disability. Some scholars have projected the body's natural inadequacy or impairment as the grounds for technical innovation. Arnold Gehlen, for instance, a right-wing German philosopher, surveyed European history of technology from the eighteenth through the twentieth century and concluded, "The necessity for technology derives from man's organ deficiencies" (2003, 213).

Disability theorists have offered less universalizing accounts of impairment as a source of invention. Tobin Siebers contends that sensory disabilities effect new communicative practices: "The disabled body changes the process of representation itself. . . . blind hands envision the faces of old acquaintances. Deaf eyes listen to public television. . . . different bodies require and create new modes of representation" (2008a, 54). Similarly, in the field of deaf studies, hearing loss is reframed as deaf gain to signal the linguistic and cultural benefits of deafness (Bauman and Murray 2009, 3). Exclusion can be a source of innovation, as a device or technical system is transformed by the imperative to accommodate disability. For example, talking books and text-to-speech scanning machines for people with "print disabilities" have spurred the widespread development of new reading formats.

Other theorists instead emphasize the "disabling" effects of modern technology. Disablement is a frequent trope for critics of mechanization and automation, or the supplementation and replacement of human activities by machines. Many of these critics have noted that the founders of scientific management, specifically Henry Ford and Frank and Lillian Gilbreth, integrated disabled workers onto assembly lines. The "breaking down" of human motion into its components, the substitution of apparatus for some of these micro-motions, and the proximity of people with disabilities to other laborers lead these commentators to claim, syllogistically, that "everyone is disabled" by industrialization. The rehabilitation of people with disabilities—their accommodation into the workplace—is thus problematically deployed to warn of the injuries that result from rationalized, repetitive factory work. This formulation overlooks the social context of efficiency and statistical reasoning that encompassed all bodies in the early twentieth century. "Disability" was marked as a distinct problem—a scalar difference from other human "limitations." More often than not, the incorporation of "human factors" into design gave rise to standardization technologies for statistically average users, excluding those with disabilities.

Postmodern theorists issue similar warnings about the pathological effects of digital, networked technology on embodiment and perception. Perhaps most dramatically, Paul Virilio describes the "plugged-in" users of computers and telecommunications as "terminal citizens," catastrophically "handicapped" by isolation, immobility, and suspicious equipment (1997, 20–21). Most scholars assume, however, that technology exhibits a "double logic," with additive and subtractive effects. Marshall McLuhan (1994, 42) famously proposed that electronic media at once extend and "auto-amputate" human faculties, the latter occurring through overuse or atrophy. S. Lochlann Jain cautions that "it is usually not the same body that is simultaneously extended and wounded" (1999, 36). An extension for one person might come at another's expense, as when certain users are excluded from a technical system, or a test subject does not benefit from the risks she has taken.

Disability theorists have critiqued the academic fields of science and technology studies and media studies for routinely exploiting disability as metaphor and exemplar in wide-ranging theories of prosthesis, the cyborg,



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and posthumanism. As David Mitchell and Sharon Snyder argue, "disability underwrites the cultural studies of technology writ large" (1997, 8). In such scholarship, disabled figures betoken technological dystopia, the exaggerated effects of new media on human bodies and relations, or the perfunctory celebration of hybridity and difference. Representations of disability in texts and audiovisual media do not simply reflect broader patterns of discourse, however. They create new symbolic associations, disseminate terminology, transmit affect, and discipline practices of looking. Thus historians Katherine Ott, Stephen Mihm, and David Serlin (2002) have called for more work on the everyday contexts of prosthesis, as ballast for the term's metaphoric proliferation. Alison Kafer similarly recommends "bringing a disability consciousness to the cyborg, attending to the specific benefits and dangers it harbors for disabled people. This shift requires an acknowledgment that human/machine interfaces are not always beneficial or pleasurable; an awareness that many disabled people lack access to the cybertechnologies so highly praised in cyborg writing; an accounting for the ways in which cybertechnologies rely on disabling labor practices across the globe; and a realization that not all disabled people are interested in technological cures or fixes" (2013, 118). Media activists and disability theorists alike have urged critical attention to the prevailing "visual rhetorics" of disability in photography and film, as well as the ways these rhetorics might be subverted or supplemented (Garland-Thomson 2001).

The category of "assistive technology" is likewise contentious within disability studies. John M. Williams, a disability journalist who has used various communication aids for stuttering, is widely credited with coining the phrase in 1982. In fact, "assistive" apparatus began to be discussed in such domains as occupational therapy, medicine, and education following World War II. In the United States, the 1988 Technology-Related Assistance Act for Individuals with Disabilities (the "Tech Act"), provided an influential definition of assistive technology, which was taken up in subsequent legislation such as the U.S. Assistive Technology Act of 1998, the Americans with Disabilities Act, the Telecommunications Act, and the Individuals with Disabilities Education Act. The 1988 act is based on a circular logic that defines assistive technology as any technology gainfully used by a person with a disability: "The term 'assistive technology device' means any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities." Katherine Ott points out that the phrasing is also redundant: "Since all useful technology is assistive, it is peculiar that we stipulate that some devices are assistive while others need no qualification. Besides serving to stigmatize and segregate a benign and inanimate entity—a device or appliance—the term 'assistive technology' also needlessly complicates understanding of the devices so designated" (Ott 2002, 21). Richard Ladner further argues that the term "assistive" "has the ring of paternalism, a view that people with disabilities need lots of extra help, are dependent and are not capable human beings" (2010, 26). The phrase advances a technological fix that is unconcerned with education, community support, or social change.

The umbrella category of assistive technology includes medical products such as prosthetics, which "replace" human anatomy or function, and orthotics, which "support" anatomy. The category includes items sold on the consumer and medical markets as well as those made by hand. Mobility, sensory, instructional, and "daily living" devices such as shoehorns become "aids" when used by people with disabilities, as do communication technologies such as speech synthesizers



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and smartphones. From pillboxes to screen readers, many assistive technologies are designed to accompany or provide access to other technologies. "Adaptive technology" is a synonym for "assistive"; however, it can also refer to equipment—especially computer-related—that is explicitly designed for people with disabilities. While these distinctions have a legal and financial rationale, many "adaptive" items simply repurpose the same components found in "mainstream" technologies, as is the case with hearing aid amplifiers and other electroacoustic devices. Some "assistive" technologies, such as curb cuts, are shared between different user groups.

What these technologies "assist" is sometimes questionable. They may be designed for "compensation" or extension, augmented or alternative communication. They may promise to facilitate independence but instead require new patterns of dependence upon biomedicine. Biomedical technologies might themselves be "disabling" through the establishment of norms and diagnostic categories, segregating or stigmatizing regulatory practices, and unwanted therapies or "adverse effects." These technologies may be at once rehabilitative and painful. They may become "stigma symbols," or they may serve purely cosmetic purposes to accommodate popular discomfort with difference. They draw attention to otherwise "invisible" disabilities, as in the case of the hearing aid or the white cane. They may exhibit a medical aesthetic that compounds disability. They might assist some users while "enforcing normalcy" for others. Cochlear implants, for instance, offer a partial and atypical mode of hearing, while at the same time threatening a minority linguistic culture.

According to Martha Scherer, "use" itself is a complex activity. Assistive technologies have high rates of abandonment, "noncompliance," and nonuse (2002, 2). Sally Wyatt has identified four general categories of nonuser: resisters (those who choose never to use a technology), rejectors (who stop using a technology voluntarily), the expelled (who stop using a technology involuntarily), and the excluded (those without access for social or technical reasons). In terms of use, Wyatt (2005, 76) notes that it may be forced, reluctant, or partial. Relationships to technology, moreover, are generally far more intimate than implied by the term "user", or by the related term, "wearer." Identity formation can occur through technological use, as exemplified by self-advocacy groups for "cochlear implant users." Group affiliation also results from technical exclusion, as with the category of "print disability," which unites disparate individuals who cannot read printed materials. Finally, access to assistive devices is always stratified; the devices are not equally available or affordable to those who might benefit from them.

Some scholars of disability and technology have urged universal or inclusive design to render the special category of assistive technology unnecessary. Given that true universality is unachievable, Graham Pullin suggests "resonant design," which attracts small subgroups of disabled and nondisabled users based on coincident needs. Voice-enabled smartphones, for example, are at once "hands-free" and "eyes-free" (2009, 93). Other possibilities include "critical design" (or "design for debate"), which aims to raise questions and unsettle established assumptions about disability, and "interrogative design," which protests or provokes strong interventions into ableist structures. Regardless, all work on technology risks assimilating what Tobin Siebers calls the "ideology of ability" (2008a, 7). Technology theory exhibits a ruling preoccupation with development and capacity. It emphasizes invention over the vagaries of use; moreover, it tends to neglect the piecemeal, the homemade, the low-tech, and the long-lasting.



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